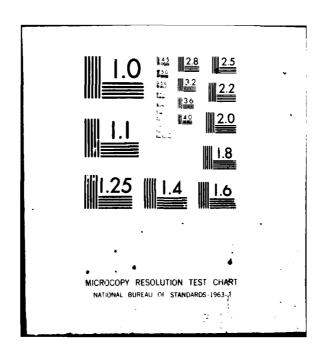
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LAKEHURST, N.J. 06733

### NAYAL AIR ENGINEERING CENTER

REPORT NAEC-91-7958

AD A O 8372

### HAZARDS/FAILURE MODES AND EFFECTS ANALYSIS

MK 1 MOD O LSO HUD

CONSOLE SYSTEM

Ship Installation Engineering Department Naval Air Engineering Center Lakehurst, New Jersey 08733

24 March 1980

Technical Report
Contract No. N68335-78-C-2002

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

SELECTE APR 29 1980

Prepared for

Commanding Officer Naval Air Engineering Center Lakehurst, New Jersey 08733

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HAZARDS/FAILURE MODES AND EFFECTS ANALYSIS MK 1 MOD O LSO HUD CONSOLE SYSTEM

Prepared by:

F. Sevcik.

P.E., C.Eng., Dipl. Ing.

Reviewed by:

John Glenn

91133 Section

Approved by:

F. B. BOICE

Engineering Officer

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AKEHURST, N.J. 08733

### NAVAL AIR ENGINEERING CENTER

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### HAZARDS/FAILURE MODES AND EFFECTS ANALYSIS MK 1 MOD 0 LSO HUD CONSOLE SYSTEM

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UNCLASSIFIED

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### PREFACE

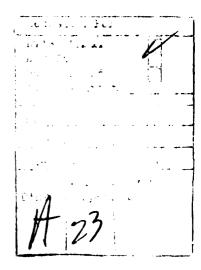
The work on this report has progressed hand-in-hand with the design effort on the Console System.

This caused an inevitable delay in completing the report, but on the other hand, it proved beneficial in introducing corrective actions, resulting from this Analysis, in parallel with the Design.

\* 3

The author wishes to acknowledge significant contributions provided by his KETRON, INC. collegues: Messrs.

G. S. Farber and W. S. Mann; the PGI Supervisor, Mr. Nathan Melman; and particularly, Mr. John Glenn, NAEC 91133 Section.



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### I. INTRODUCTION

This report presents the results of the Hazards/Failure Modes and Effects Analysis (H/FMEA) for the NAVAIRENGCEN designed MK 1 MOD 0 LSO Heads-Up Display (HUD) Console System.

### II. PURPOSE OF THE ANALYSIS

- A. The analysis of the MK 1 MOD 0 LSO HUD Console System was performed primarily to disclose potentially critical and catastrophic safety-related functional failure modes of components and subassemblies comprising the System.
- B. Efforts were directed toward identifying single-point failure modes that could result in:
  - 1. personnel hazards leading to injury or death; and
  - 2. loss of equipment and mission capability.
- C. A major objective of the analysis was to provide design improvement recommendations to preclude or circumvent identified failure possibilities, so that the resulting hazard risks would either be eliminated or greatly reduced.
- D. The scope and methodology of the H/FMEA are discussed in detail in Section VI of this report.

### III. SYSTEM DESCRIPTION

- A. The LSO HUD Console System is located at the LSO's (Landing Signal Officer) Work Station on the aircraft carrier.
- B. The mission of the LSO Work Station Facility is to serve as a focal point for recovery information display and communications required for flight path guidance control coordination between the LSO and pilot of the landing aircraft. The MK 1 MOD 0 LSO HUD Console System has been developed as part of an effort to increase the accessibility and visibility of information displays and communications facilities in the LSO Work Station to permit more rapid perception and response by the LSO to flight path deviations under all weather conditions to improve the safety of recovery operations.

- C. The LSO HUD Console System consists of a display subsystem and a hydraulic lifting unit subsystem.
- 1. THE DISPLAY SUBSYSTEM receives data signals from various existing shipboard systems for processing and display in the LSO HUD console. Calibration, testing, and troubleshooting of display circuits is facilitated with a piece of portable special purpose test equipment. Those systems providing inputs to the HUD console include:
  - a. SPN-42 Radar (automatic carrier landing system)
  - b. SPN-44 Radar
  - c. ILARTS (Integrated Launch and Recovery Television Surveillance) or PLAT (Pilot Landing Aid Television) system
  - d. FLOLS (Fresnel Lens Optical Landing System)/Arresting gear cross-check system
  - e. Landing area status system
  - f. Ship's wind measuring system
  - g. Ship's 21MC intercom system
  - h. MOVLAS (Manually Operated Visual Landing Aid System) MK 1, MOD 2
  - FLOLS MK 6 MOD 3 or MK 6 MOD 2 with Trim/Harmonization computer
  - j. FLOLS Wave-Off subsystem
- 2. THE HYDRAULIC LIFTING UNIT SUBSYSTEM provides a means for raising the HUD console to an adjustable height to accommodate viewing by an LSO standing on the LSO Platform. It also provides for lowering the HUD console to an unobstructing level below the flight deck into a storage enclosure. Raising and lowering control is accomplished within the LSO work station, and control circuit interlocks guard against retracting the console when it is misaligned with its storage enclosure and raising the console when the storage enclosure lid is down.
- D. MKI MOD O LSO HUD Console System components (Units 1 through 5) are identified in the table of contents of this report (page 3) and individually described in the work sheets in Appendix A.

E. The LSO HUD console will be complemented in an improved LSO Work Station with side mounted LSO and assistant LSO communications attachments, an LSO "Base console", and provisions to hydraulically operate the LSO platform windscreen from a central control using the LSO HUD Console System Hydraulic power package. The communications attachments to the HUD console and the base console are the result of a repackaging of existing communications and display facilities in the LSO Work Station to eliminate redundant displays and provide for more accessible communications facilities with more efficient utilization of space.

### IV. RESULTS AND RECOMMENDATIONS

### A. RESULTS

The tabulated determinations of the H/FMEA of the HUD Console System are presented in Appendix A of this report.

The evaluation of the subsystems is included in Section  $\boldsymbol{V}$  of this report.

Basically, the System was found well designed, with appropriately used redundancies and fail safe principles.

The few possible hazards found were immediately brought to the attention of the Program Management (NAEC), which provided the needed corrective actions.

### B. RECOMMENDATIONS

Design improvement recommendations, resulting from the analysis, are presented in Appendix B of this report.

Each recommendation is numbered related to the  ${\rm H/FMEA}$  table and item.

In the matrix, there are indications whether the recommended improvement is for:

- a -- General Reliability, Simplification, Design Improvement
- b Avoiding, Eliminating & Reducing Potential Hazards
- c Controlling & Minimizing Potential Hazards
- d Incorporation of Fail-Safe Principles

There is also an indication, whether the respective recommended design improvement should be used for:

- e -- Existing Design
- f Future Design

### V. SUBSYSTEM CONSIDERATIONS

Analysis of this System's components and functions suggests that even though the possibility of failure modes of critical or catastrophic nature (category II or I) does exist, the corresponding probabilities are reasonably low.

By identifying these particular hazards, the corresponding corrective actions will eliminate them from operating times, or will reduce the probabilities of their occurrences to much lower figures, reducing the risks to acceptable levels.

The review of the categories I and II in each subsystem follows:

UNIT 1: Category I: None found.

Category II: a) See Nos. 1 and 2 in Appendix B.

b) The loss of Console and HUD control due to discontinuity in the Cable's connector is expected to be corrected in a routine check-out of the System. (See Item No. 18.0 of the Unit 1 work sheets.)

UNIT 2: Category I: None found.

Category II: See Nos. 6, 7, 8 and 9 of Appendix B for the recommended corrective actions.

UNIT 3: Category I: None found.

Category II: See Nos. 11, 18, 19, 26, 28, 30, 31 and 32 for the recommended corrective actions.

UNIT 4:

Category I-II: An interesting problem was found in specification, testing and requirements for operation of the Relays 518915-1, that provided a high probability, in fact a certainty, that the Relays would not allow low current signals (below 40 m amp) to pass through.

> The Program Management was apprised of the problem as soon as it was discovered, and immediately provided a corrective action: to form two groups of these Relays -- one for the high current uses to be tested with 10 Amp current through the contacts, and one for the low current Signals, to be tested with appropriately low currents.

However, even with a good marking applied to distinguish these two kinds of Relays, there will exist a probability of a human error and, therefore, the corrective actions, as suggested in Appendix B, Nos. 33 and 34, would seem more appropriate.

CABLES:

Category I(-II): The Wave-off Signals and the Deck Status warning were found with redundant wiring going through the same Cable (W-O Signals), or there is no redundancy for the Foul Deck warning.

> See Nos. 36 and 38 of Appendix B for recommendations.

UNIT 5:

Category I:

None found.

Category II:

See Nos. 39, 40, 41 and 43 of Appendix B for identification and recommendations.

### VI. SCOPE AND METHODOLOGY OF ANALYSIS

### A. SCOPE

The Hazards/Failure Modes and Effects Analysis (H/FMEA) was performed on the MK 1 MOD 0 Heads-Up Display (HUD) Console System in accordance with the Work Statement of the Purchase Order 2288 of Power Generators, Inc., dated 5 June 1978.

The "Unit" Cables, even though not included in the Work Statement, was included by the Analyst because of the logical need for the completeness of the System.

The list of all the Subsystems ("Units") appears in the Table of Contents, page 3, under Appendix A.

The Analysis was performed at the levels of assembly consistent with available design definition and criticality of the various System functions.

The lowest level to which the Analysis was carried out was the component; i.e., Switches, Relays, Valves, etc. Failure modes associated with these elements were identified and related to their effect on the performance of higher assemblies or functions up to and including the System.

### B. METHODOLOGY

### 1. DESCRIPTION OF THE H/FMEA FORMAT

Documentation structure of the H/FMEA is in general accordance with accepted industry standards, namely the Society of Automotive Engineers publication, Design Analysis Procedures for Failure Mode, Effects and Criticality Analysis (SAE ARP 926), and MIL-STD-1629, Procedures for Performing a Failure Mode and Effect Analysis. The FMEA was performed utilizing the System's related drawings and schematics provided by PGI/NAEC.

Reference is made to Figure 1 at the end of this section illustrating the H/FMEA form utilized for compiling the analysis.

The form heading information is used as follows:

- a) The TABLE denotes the major system and subsystem ("Unit") indexes.
- b) NAME presents the major system and subsystem titles.
- c) The system document where the treated components are defined is entered on the DWG. NO./REV. line.
- d) The page and total pages of a given subsystem table is at the upper right of the heading.

Column 1 numerically codes the component analyzed with respect to the subsystem indexes. The complete component/table item index is, for instance: Unit 1.7.0. for reference use.

Column 2 indicates the system, subsystem and component titles and includes brief descriptions of the functions at each level so the reader may gain insight into the significance of the component analyzed. Sketches, Schematics and other useful information have been entered when of importance or interest.

Column 3 lists the hazardous-functional failure modes of the component being treated and examples of causes where necessary.

Columns 4 through 9 are utilized to describe the effects of each assumed component failure mode upon the personnel, system and mission. These effects were determined based on a detailed analysis of the component functional relation to each system level.

Column 10 entries indicate if the considered failure would be detectable by the operator.

Column 11 classifies failure effects on a scale of I to IV in decreasing severity in accordance with Military Standard 882A, System Safety Program Requirements. A detailed explanation of the classifications is included on the next page. The numerical system of failure criticality codes is intended to quickly highlight for the reader those areas of the analysis where serious problems have been identified.

Column 12 is reserved for the Probability of Occurrence of the identified Failure Mode, in accordance with MIL-STD-882A.

Column 13 presents commentary the analyst may provide in the form of pertinent information which will clarify the results of the particular failure mode considered. These remarks include statements describing inherent compensating provisions of the design, and/or recommended design or procedures improvements.

At the bottom of the form there is the "NOTE", which explains in detail Column 11 ("Hazard Level") and Column 12 ("Hazard Probability") headings.

### 2. FAILURE/HAZARD CLASSIFICATION CRITERIA

Potential failures were classified relative to their criticality in accordance with the following criteria (per MIL-STD-882A, paragraph 5.4.3.1: Hazard level):

- a) Category I Catastrophic
  - -- Will cause death or severe injury to personnel or system loss
- b) Category II Critical
  - -- Will cause personnel injury or major system damage, or will require immediate corrective action for personnel or system survival.
- c) Category III Marginal
  - -- Can be counteracted or controlled without injury to personnel or major system damage.
- d) Category IV Negligible
  - -- Will not result in personnel injury or system damage.

The probabilities of the potential failures-hazards were selected according to the following criteria (per MIL-STD-882A, paragraph 5.4.3.2):

- A Frequent
- B -- Reasonably Probable
- C -- Occasional
- D -- Remote
- E Extremely Improbable
- F Impossible.

NOTE: In classifying the Failure/Hazards, the worst case effects on operating personnel or equipment were considered.

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FIGURE 1

### APPENDIX A HAZARDS/FAILURE MODES AND EFFECTS ANALYSIS MK 1 MOD 0 LSO HUD CONSOLE SYSTEM WORK SHEETS

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KASC-91-7958

UNIT 1

TABLE: HAME:

HEADS-UP-DISPLAY CONSOLE (Sub-system)

620310 DMG. NO./REV.1

Page 1 of 113

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(Srb-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE: . NAME:

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Page iii of 113

TABLE: UNIT 1

MEADS-UP-DISPLAY CONSOLE

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

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HEADS-UP-DISPLAY CONSOLE (Sub-system)

UNIT

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UNIT 1 TABLE:

NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

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	COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)			board					;		•	•
HAZARD	30	PROBABILITY  COCHERENCE	(13)	characters for		00 Star			ding d light		g S		on. ht	91
•		tvortesad eval grasah)	(11)	t charac		port and 0 to 100° Star	œ.		dunually Operated Visual Landing ght for "medtball" except red light	s are:	scale	trin	altitude selecti 150 ft d and rig	e or less on the 1/4 mile,
FAILURE		DETECTAE BY OPERATOR	(10)	light incandescent			99 knoda		rated Vi	eads-Up-Display combiner glass	Vertical	s ship'	bol chowing azimuth and ft or 10 ft sca e facto tude of +240 ft up and . Asimuth of 80 ft lef icated with the 10 ft s	is one nautical mi of its distance fr 3/4 circle equals 1/4 mile, etc.
	MISSION	POTENTIAL LOSS	(6)	at inc		.o 80	3		_2	comp	descent.	motion pl	s azi t sca 40 ft of 8	
	MIS	SSOT	9			0/8	ra fo		p's Munual r light fo	EP Jay	de s	play.	or 10 finds of +2 Azimuth	
T ON:	SYSTEM	DAMAGE	3	SO JOE	140/min	characters/0	characters fo	ē.	. I.	9-0	ate	rame MD dir	ft of tude	function of the eck, 3/4
BFFECT		SSOI	(9)	9reen	- <del>-</del>			monitor.	de e		t/minute	hip.	t ay acto	as a fun-
	PERSONNE	INDOK	(5)	System (ACLS): Mode I is green	- T	nescent	ndescent	v.	r of t	<del>2</del>		f of	h. Arcra n-polit wi d right an ft s:ale d -50 ft a	on raige of air ppears as fun approiches the e, 1/# circle e
-	PBR	FIAES	3		- Turing	Incan	Incan	le le	reen freen	9	200	1 -19 f	2 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	spears appron
HAZABDOUG	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Automatic Carrier Landing Lock-Dn, Mode II or III.	Wave-Off; Blue flashing, approx.	ingle: White light	Speed: White light	Pilot Landing Aid Telev.sion	MOVIA): Incandescent reparter of the Aid System. Datum bar, green light for danger lights.	ilities and appearance of the	of HUD display.	Ramp Wotion: +20 ft and -19 ft of hhip's rame mot separately. Vertical scale on left of Hilb display	Glide-Slope & Line-Up Path: A rerait symbol chowin relative to the touch-down-polit with 30 ft or 10 f Azimuth of 240 ft left and right and altitude of +2 are indicated with the 30 ft size actor. Azimuth and altitude of +80 ft and -50 ft are injected wit	Range Circle: Appears when raige of from the carrier and disappears as Carrier; as the aircraft approaches 1/2 circle equals 1/2 mile, 1/8 circle
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(13) Auton	(14) ACLS	Pulm (51)	(16) Wind	(17) PLAT:	(18) MOVIA Aid 5 (0r d	The measurement capabil	(1) Rate right	(2) Ramp	(3) Glide relate Azimu are 1	(4) Range from Carri
	ITEM	<u>.</u>	ε				· (A-							

Hazard Lev.1, Column 11, per MIL-STD-882A. para. 5.4.3.1 (I-Catastrophic; II-Catitical: III-Marginal: 7V-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frontant: 9-Negeouthly Probabie; C-Occasional; D-Runote; E-Lacremely Improbable;
F-Improbable; NOTE

21 (A-5)

of 113

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Page

("ALLURE MODES & EFFECTS ANALYSES - SYSTEM" SAFETY ANALYSES WOLLOW SOLD LSO-HUD CONSOLE SYSTEM

:\Acc-01-7953

UNIT

TABLE: NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

620310 NO./REV. BEG.

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) (13) and orierating controls. are described on the are listed on Table 1. The illustrate, by Hee of block PROÉMBILITY OF STATEMENTS (12)- HAZARD Console their power supply requirements, (11) (HAZARO LEVEL) NOLLYOLLISSYT FAILURE A description of the individual subsystems contained within the Hehds-Up-Display neets. The various sub-systems described and their location within this document of for the sub-systems contained in Unit 1 are listed on Table 2. Figures 3 to 16 input/output connections between each of the sub-systems, their power supply required. **SERATOR?** (10) DETECTABLE BY POTENTIAL SSOJ 6) MISSION 8 SSOI SYSTEM EPPECT ON 3 DYWYCE 9 SSOI ERSONNEL (2) INJOEX separate worksheets. The various sub-systems described and drawing numbers for the sub-systems contained in Unit are diagrams, the input/output connections between each of the s 3 **PIAES** FAILURE MODE (HAZARD RELEASE) **FUNCTIONAL** MECHANISM) 3 (COMPONENT, MODE OF OPERATION, FUNCTION) 3 ITEM 3 , 2

Hazard Level, Column II, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Imposible) MOTE

22 (A-6)

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

} 4

NAEC-91-7958

TABLE: UNIT 1

NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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v	SNOTTAGNAMMODAS . STNAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAPETY CONTROLS)	(13)																							
HAZARD		YTT. II SABORY DARRIUCCO	(12)																						•	
		TYOTTICZĄD ZVZI ORASAH)	(11)			. 1		(dans)	(qn	rcultry			1	101												
PAILURE	3.1. S.	DETECTAL BY COPERATOR	(10)					-Display	splay (F	o Lamp C				Deck status and FLALS wave-OIE status indicator Wind Direction Indicator											>	
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	MISSION	SSOI	(8)		CONT		(GIIII)	(MUL) n Head Head	eads-	Pro			3		ator	ator	Itor								or As	
S S S	$\vdash$	DAMAGE	(2)		87	T		ton o	a uo	Scale	ator	cator	:	tor	Indic	Indic	a Mon		stem.				ultry	•	MEr	
EFFECT	SYSTEM	SSOI	(9)		TAB	BLEA	2	dicat	aging	icle	Indic	Indi	Or	ndica	tion	tion	Camer		λg uo∙	•	_	ors	Circ	bly	gue u	<del></del>
EFE	INE	MUCHI	(5)		WORKSHEET TABLE OF CONTENTS	SUBSYSTEM BLEMENT	Tage 4	DD) In	er on-	ay Ret	scent	Archu	ndicat	ton I	angler	engles	rline	sator	hicati	Contro	at to	toulat	leplay	Assem	ant dance	-
	PERSONNE	SZAIT	3		- 1	SUB	11/ 001	nt (R but (R	Line	Diepl.	Rate of Descent Indicator	Ramp Motion/Trim Indicator	Airspeed Indicator	Deck Status and Fluis Wav Wind Direction Indicator	Aircraft Designation Indicator	Aircraft Designation Indicator	PLAT Centerline Camera Monitor	MOVLAS Repeator	Intercommunication System	Operating Controls	Debumidification	Mer R	0-dn-1	Plate	Jay C	
-Silvage en		PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		TABLE 1.			Rate of Descent (ROD) Indication on Heads-Up-Display (HUD) Rate of Descent (ROD) Indication on Heads-Up-Display (HUD) Ramp Motion/Tria Indication on the Heads-Up-Display (HUD)	Glidepath and Line-Up Imaging on Heads-Up-Display (HUD)	The Heads-Up-Display Raticle Scale Projection Lamp Circuitry	Console Rate			Console Wind		Console Aircr	-	Console MOVLA		Console Quera	Console Debus	Console DC Power Requistors	Console Heads-Up-Display Circuitry	Console Back Plate Assembly	Heads-Up-Diuplay Combiner and Mirror Assembly	-
		OPERATION, FUNCTION)	(3)			ITEM NO.		2.0	0.4	0.4	7.0	9.0	0.6	0.01	12.0	13.0	15.0	16.0	17.0	0.61	20:0	21.0	22.0	23.0	24.0	
	ITEM		(1)																							

NOTE: Mazard Lavel, Column 11, per MIL-SYD-882A, para. 5.4.3.1 (I-Catastrophic: XI-Critical: III-Marginal: IV-Mediatible)
Hazard Probability, Column 12, per MIL-SYD-882A, para. 5.4.3.2 (A-Frequent: B-Mensembly Probable; C-Occasional; D-Namote; E-Extremely Improbable;
P-Impressible:

Victor Manager

ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOU O L'SU-HUU LONSOLE SYSTEM	NAEC-91-Z958	COMBOLE	Page viilof 113
(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) S	UNIT 1	NAME: (Sub-system) HEADS-UP-DISPLAY COMSOLE	DMG. NO./RBV.1 620310
	TABLE:	NAVE:	DMG. W

B																															
	SNOTTE STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)				13g)	-		-	•			-	-				. فعنو			=				-				-	
LARD	30	PROBNELLITY COCHREDACE	(12)				PART WMBER	620331-1	620333-1	620332-1 518659-1	620392-1	620360-1	620337-1	519039-1	620339-1	620336-1 620326-1	520361-1	520371-1	520329-1	620318-1	620328-1	520370~1 53666 1	-90091	518645-1	-11001	518655-1	1.60016	10001	518649-1	620338-1 620321-1	
UE - HAZARD		Tropicskio Evel Grassii)	(11)	_			Pa i	•	ω.	øv	. •	•	φ	<b>.</b>	<b>.</b>	o vo		•		ω,	•		n 1		n i					, 6	' <b>-</b>
FAILURE	1	DETECTAB BY OPERATOR	(10)	_			1																								-
	Š	POTENTIAL	(6)	<u> </u>	3																										•
	MISSION	SSOT	(8)		88																										-
Š	Η-	DAMAGE	(7)		SPLAY	BLIES	×							_										•	<b>.</b>	1 Ass y	A85 Y				•
EFFECT ON:	SYSTEM	SSOI	(9)	-	D-0-0	ASSEP	DESCRIPTION	e le	-	<u>`</u>	<u> </u>		4 . w	n Yoke						Yoke				À	ra yea	٠,	~				•
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	PRESONNE	SZAIT	(4)		- 1	)i		onito	. Ass	6 8 CB		, ,	ent I	280	tor A	But	, ,	Shiel	, Nes	De Cle		l Ass	1 786	ent C	HOCI			88 P	Card	2. T	
017000	-	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		TABLE 2.			PLAT Video Monitor Chassis	Airspeed Ind. Ass'y	Deck Status 6 Scale Ass'y Beamletor Board Bes'o	HWD Deflection Amplifier	ACLS Ind. Ass'y	Rate of Descent Ind. Ass'y	PLAT CRT and Deflection Toke	Range Indicator Ass'y	MANIAS Ass'v	Card Cage Ass'y	Transformer Shield Ass'y	High Voltage Ass'y	HUD CRT and Deflection Yoke	Heater Ass y	Control Panel Ass'y	Card Extender Ase'y	Rate of Descent Card Ass'y	Range & Ramp Motion Card Ass'y	Synchro/Analog	Synchro/ Analog	Alraped Card Ass y	HUD Display Card Ass'y	21MC Intercom Ass'y	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)				DESIGNATION	IAI	182	LAS LAS	185	146	147	140	189	OLA!	1812	1413	JAI4	IAIS	9181	IAI		9141	IAZO	1821	1A22	IAZJ	1824	1825	) * E 4
	ITEM	0	ε																												
				<del></del>			24 (A	-8)	_	_	_	_	_		_	_	_	_					_	_	_		_	_		_	

NOTE: Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Critical; III-Marginal; IV-Neuligible)
Hazard Probability, Column 12, para MIL-STD-882A, para. 5.4.3.2 (A-Fraguent; B-Ronsonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 150-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-aystem) HEADS-UP-DISPLAY CONSOLE

DMG. 110./REV.; 620310

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			_		NAEC-91-7958
	Sind and an annual conditions	CONTENTS ACCOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES BAFETY CONTROLS)	(13)		C (GRO38S) NATON SITY
HAZARD		YTT.II.8A8ORG	(12)	[ c o 5 ] 5 1 3 Q 5	PANEL PANEL ILLUMINA TION INTENSITY (IPIT)
•	NO:	monicali avai omani)	(11)	1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	,
FAILURE	21 31E	DETECTAL BY OPERATOR	(30)	30 30 30	
	MISSION	SSOT TVILINT TOSS	(8) (8)	HOD PROJECTI LAMP INTENSITY (5/8667)	8
L	-	DAMAGE	(3)	HUB HUB LATEN 1NTEN 15.8 (5.8 (5.8	PANEL LLUMINATON ON OPE SWITCH (IAIT)
EFFECT ON:	SYSTEM	SSOT	(9)	19.3. 10.00	PANEL ILLUHINAT ON OPE SWITCH (IAIT)
3	PERSONNET	YNUCHI	(2)		
	_	PIAES	3		
HAZARDOUS-	FUNCTIONAL	(HAZARD RELEASE WEGHANISM)	(3)	Say (1.01.7) 100 Scous  Swirting (1.01.7) (1.01.7) (1.01.7) (1.01.7) (1.01.7) (1.01.7)	( voransint)
ITEM DESCRIPTION	(COMPONENT, MODE OF	OPERATION, FUNCTION)	(2)	T3 THUE  GONTROL  CONTROL  SW  CONNECTORS  (1788  SW  (1788  SW  (1788  SW  (1788)	# 5 # # # # # # # # # # # # # # # # # #
ITEM		ġ	3		-

NOTE: Hazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic: II-Critical: III-Marginal; IV-Newiligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.7.2 (A-Frequent: B-Reusonably Probable; C-Oscasional; D-Rencte; E-Extremely Improbable;
P-Inpressible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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EC-91-795		$\neg$	
Page X of 113	COMPENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	CONVECTORS  CONVECTORS  IMITS +  IMITS +  IMITS +  CONTER INTENSITY  CONTROL
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	INJORY Z	<u>s</u>	***************************************
	E SZAIT	€	
SPLAY CONSOLE	US- NAL MODE ELEASE SM)	(3)	OSY SIS
NAME: (Svb-system) HEADS-UP-DISPLAY DMG. NO./REV.: 620310	IPTION WODE OF UNCTION)	(2)	(ARF.) (LWG) (A4)
NAME:	ITEN NO.	3	
			26 (A-10)

NOTE: Hazard Level, Column 11, per FIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Menilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IN-Remote; E-Extremely Improbable;
F-Introduction

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-2958

UNIT 1 TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

DMG. NO./REV.: 620310

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		(0)	-1										NAE	C-9	1-7	958		
	COMMENTS; RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)			702 ras		^c+		Reo			<b>)</b>					
HAZARD		VILLITA/BORY COMBRIDOS	(12)			tod INDICATOR	•	620337		, 32 24	k		1NTENS17Y				٠	
•	E 20	TACOTTICZAD AVS.I GRASAE)	æ			400 1ND	•	(62)	7			! ኦ		202				
PAILURE	371 371	DETECTAE By OPERATOR	(10)			<del></del>		۳/ <i>ه</i> دار			f '		Pointer	CONTROL				
	ION	POTENTIAL LOSS	(6)	_		18:834	/1524/	ξ.			≹ :	Î	00	Ö				
	MISSION	SSOT	(8)	•	Q		٤				on/off							
ž	SYSTEM	DYMYCE	(2)		19.8						w0							
EFFECT ON	Ĺ	SSOT	(9)				<b>}</b>	7		k ن	33							
<u> </u>	PERCONNET	YNULNI	(5)	518645	6	4	7	>	Ţ	SIGNA	SCA LE							
	SHE BE	PILLES	3	315)	1919	SOD SIG.	- +5 v	<b>&gt;9.</b>	47 S		کد ده							
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		8,4,	E78141			0.5 <	*	POINTER	> 0a +			CONNECTORS	* 151.01	1317JB X	
	ITEM DESCRIPTION	COMPONENT, MORE OF OPERATION, FUNCTION)	(2)			78 , , , , , , , , , , , , , , , , , , ,	**	<b>t</b>	+61					•	(6,5)	()		
	ITEM (	O	3															

MOFE: Mazard Laval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Marilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 9-Peasonably Probable; C-Occasional; I-Famote; B-Extremely Improbable;
F-Impressible;

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

Page xii of 113 NAEC-91-7958 HEADS-UP-DISPLAY CONSOLE 620310 (Sub-system) DMG. NO./REV. 1 UNIT 1 TABLE: HAME

•		HAZARDOUS-		-	FFEC	EFFECT ON	L		FAILURE	•	HAZARD	
	ITEM DESCRIPTION	FUNCTIONAL	PEP	PERSONNEL		SYSTEM	MIS	MISSION	27 371	(7)		COMMENTS, RECOMMENDATIONS,
	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	FIAES	YAULNI	SSOT	DAMAGE	SSOI	POTENTIAL POTENTIAL	EATCETAG BY FOTAREGO	IVOTTICSAID BVBI OHANAH)	YILLIEASONY DASHILDOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)
[	(2)	(3)	€	(3)	છ	3	<b>(8)</b>	(6)	(10)	(11)	(11)	(13)
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·	THIS CAN	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	0 2 2 2 0	ROWP MOTION SCILE & POINTER ON/OFF	1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00	* 2	1	POINTER INTENSITY CONTROL	\$ \$ 1.5 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	r R 23.		867161 = *
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Hazard Levol, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Murginal; IV-Menjigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Ramote; &-Extremely Improbable;
F-fmv-sibile) NOTE

### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 150-HUD CONSOLE SYSTEM MAEC-91-7958

UNIT 1

TABLE:

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SOT (S) CONTROLLE CONTROLL	A CONOLT.  SO A CONOLT.  SO A CONOLT.  SO A CONOLT.  A A	A SOCIAL POTENTIAL DETECTABLE PATIURE - HAZARD LEVELD COMMENTS OF
HEADS-UP-DISPLAY CONSOLE  120310  PTION FUNCTIONAL PUNCTIONAL PUNCTIONAL HAZARDOUS-PEI PRICTIONAL HAZARDOUS-PEI PONTER PONTERSE ON OFF  CONTROL CONTRO	SINGLED TANDONY AND THE PROPERTIES ON THE PROPERTIES OF THE PROPER	PEECT ON,  FAILURE - HAZARD  SUSTECT ON,  A C C C C C C C C C C C C C C C C C C
AZARDOUS- UNCTIONAL ILURE HODE ZARD RELEASE ECHANISM)  (3)  (3)  (3)  (5) \$65.	NNET SYNCTEM NIESTON (S) LOSS SYNCTEM NIESTON (S) LOSS SYNCTEM NIESTON (S) CONO (S) (S) CONO (S) (S) CONO (S) (S) (S) CONO (S)	ATHERED (1) DAMAGE TO A S. S. CO. CO. C. T. C.

NOTE: Hazard Lavel, Column 11, per MIL-SND-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, per MIL-SND-882A, para. 5.4.3.2 (A-Frequent; E-Rassecably Probable; C-Oxasical; II-Ranote; E-Extremely Improbable;
F-Impressible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM MAEC-91-7958

UNIT 1

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) せてのひし **/484/** - 1917JE \* IAITU Page xiv of 113 DECK STATUS 3 (62033Z) INDICATOR DC AGG BRO. ASS'Y. BRD. (6/8699) , A 4 4 / 20 n T +18 (17) **ENGRANCE** - HAZARD POBLIETY OF 17871 INTENSITY (11) HAZZIFICATION (HAZZAE DEVEL) STATIS DECK FAILURE VARIABLE LAMP OPERATOR? (10) Ed IXI DETECTABLE BY TAITNETO9 3 MISSION TIR VDC オグロノワノ 9 SSOT 3 SYSTEM BFFECT ON: DAMAGE (2) SSOT 1418 EPSONNEI (2) CLEAR DECK の子子 りたれ INDORK  $\widehat{\Xi}$ LIVES 1 A /R J8 WAVE FOUL FAILURE MODE (HAZARD RELEASE HALARDOUS-FUNCTIONAL HEADS-UP-DISPLAY CONSOLE MECHANISM) 3 人とのなながとして SYNCHRO CABLE \*08 イン 48 (COMPONENT, MODE OF OPERATION, FUNCTION) 620310 (Svb-system) 3 DAG. NO./REV.: TABLE NAME: 3 ITEM ₹

30 (A-14)

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Memoto; B-Extremely Improbable; F-Impossible) Ë

FIGURE 8, DECK STATUS INDICATION

11SVA-C

ALEAR DEAK

DESIGNAHON

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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NAEC-91-7958

xv of 113

Page

CONSOLE HEADS-UP-DISPLAY TINO FABLE:

(Sub-aystem) HAJE:

620310 DMG. NO./REV.

ACCIDENT PREVENTION MEASURES SAPETY CONTROLS) FOR SEVEN SEGNEN 44, 25, 26 CONTROL - ALL COMMENTS; RECOMMENDATIONS; ABFER TO COMPENSATING PROVISIONS オト オカ < J7 なり ON/OFF SW ALL SUVEN SEGILLAT INTLNSIFY 1241 ふく MOIC. 5 となく (13) 101875 AVW LAMP TEST 1251 225 89 \*5 Ţ 1100 すり \* **†** 0 ' (12)**ENGRICO** HAZARD THURABUILLY OF **\* 2** +15. WIND SPUED 4113073A 071M 1(000347) (HAZARI DEAZARI) (11) WIND DINEL (219052) なつのワイ PAILURE 10006 £ 0.4.7 OPERATOR? (10) DETECTABLE DETECTABLE 3.8 O TORE 6 MISSION Anong State 1001C. 1355 Y. (3/8686) WINE DIR (180618) 9 SSOT 3 DIOIT 19695 ELIBEI LAMP 7537 'n ε SYSTEM EPPECT ON DYMYCE 31 (9) 620360 SSOT BREONNEL (2) LOCK-ON, LIODE I, II, III ACEL DESIG XXUCNI (519050) (645059)++ ACET DEBIE. ACAS INDIC. Ξ +000/ + DIVIT 10001 A131/1218 PAILURE MODE (HAZARD RELEASE MECHANISM) PUNCTIONAL IIAZARDOUSħ E MINCHINE DE L'INNATION 4 2 B ಸವಂ/೧೦ ? LANIES 126 جُ 1783 TRO WAYE-OFF 100 E (I, I, II) 8 × 8 44 ACL 8 400K-00 87.36 クネタ (COMPONENT, MODE OF OPERATION, FUNCTION) \* して といく まり 45 36 オメカ - RB v (2) ITEM 3 į

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critica; III-Merginal; IV-Nerligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasamably Probable; C-Occasional; D-Marke; E-Extremely Improbable; P-Ingressible) NOTE:

ACLS STATUS, AIRCRAFT DESIGNATION, WIND SPEED, WIND DIRECTION INDICATION

# - 1917B

1511810

CONNECTORS

PICURE 9.

WAVE OFF

440

31 (A-15)

NAEC-91-795

4

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-IUD CONSOLE SYSTEM

UNIT 1

FABLE:

MAEC-91-7958

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS) 6113 gride cathode heater Page xvi (13) P/0 1A17 CRT & YOKE (ALL PS (ANDDB) (514034) ושומו (אסגב) (180) 80181 + TO TILLITARORY TOMBREDOO HAZARD (HAZAI GAAZAH) (11) , FAILURE DETECTABLE BY CREARTOR? (30) 121101 מא/סצב 10153 FOTENTIAL 6 MISSION iain. MONITOR <u>e</u> 1660331 SYSTEM 3 RFFECT ON DAMAGE SISSUHU 12121 VERT HOLD 9 SSOI EPEONNET V10E0 (2) INCONI Ξ ( D / 79 R13 FAILURE MODE (HAZARD RELEASE MECHANISM) HAZARDOUS-FUNCTIONAL CONSOLE 3 (Sub-system) HEADS-UP-DISPLAY J-W > 011 Powar ָרְס טְרָּ בְּעַס מְרָּ 10001 VIDEO 1702 67 45 (COMPONENT, MODE OF OPERATION, FUNCTION) 620310 3 DMG. NO./REV.: HAME: ITEM Ξ Š

32 (A-16)

Hazard Lawi, Column II, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Medigible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Roasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable; F-Ingressible) 

FIGURE 10. PLAT HONITOR SYSTEM

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## (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 1

.

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOIR

DMG. NO./REV.: 620310

Page xviiof 113

			<u> </u>							NAEC-91-7958	
	SNOTTAGNAMODER - STNAMWOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)						7.08	4+ S S - 4 (6.3 v)  (4- S S - 4 (6.3 v)  (7-1) MMFR  (000 1 (8.0 v)  (1.0 v)	
IIAZARD		YTLII SASORT	(13)	-	•						•
1	(E)	INCITICATION (INCITICATION (IN	(11)	Γ					7		-
FAILURE	37: 21:	EATTOTTEC YE YOTARETO	(10)			×			26)	73 - 4 73 - 4 76 10 12 76 12 17 00 7 10 14 6.3 V A-C	٠
	MISSION	POTENTIAL POTENTIAL	(6)			SSE			680326	1 A 3 - 1 A 3	•
_	MIS	SSOT	(B)						(61	1 4 6 1 3 5 5 9	
T ON:	SYSTEM	DAMAGE	(2)	_	:	MOVLAS		-	-	* ` * `	
EPPECT		SSOT	(9)		: W :	ž		4		1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
_	PERSONNEL	MUCHI	(2)	L			$\leftarrow$		<u> </u>	35 +> "NDICATOR ON OFF SWITCH SALL, WAR	
	PER	TIAES	3	•				11	0/4/	35, 100, 00, 00, 00, 00, 00, 00, 00, 00, 0	i
-SINGARAH	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)					151151	*	***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  **  ***  ***  ***  ***  ***  ***  **	
	ITEM DESCRIPTION	OPERATION, PUNCTION)	(2)				5	M0/108		4 1 7 4 **	
	ITEM	ું જુ	ε							T	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical: III-Marginal; IV-Newligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Marnote; E-Extremely Improbable;
F-Impressible)

(FALLURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

UNIT 1

TABLE:

NAEC-91-7958\_

TITES NO./MEV.   62010  TO OFFICIAL PROPERTIES NO. OFFICE NO. OFFIC	EC-91-795		_		-	
DNG. NO./WEV. 1 520310  TITEM DESCRIPTION  WILLIAM	Page xviii of 113		SNOITEUNAMMODER : STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	INTERCOM)
MANE: [SIND-LIFE DESCRIPTION   MACHINE   MACHI		AZARD	OE.	TILILEAGORY	(12)	
MMG. 16:40-system) HEADS-UP-DISPLAY CONSOLE  DMG. NO./REV.: 620310  HATANDOUS- PUNCTION: PUNCTIO		١.	E 29	TACTITICATI EVAL GRANH)	(11)	
DMC. NO./REV.: 620310  INATAROUS-		FAILU	ET.	SATDSTEC YE XOTAXEGO	(10)	
DWG. NO./REV.: 620310  INTEM DESCRIPTION  INTEM DESCRIPTION  INTEM DESCRIPTION  INTERNOS OF PRINCE ON INTERNOS OF PRINCE			NOI	FOZE FOLENTIAL	(6)	
MAME: (Stub-system) HEADS-UP-DISPLAY CONSOLE  DMG. NO./REV.: 620310  ITEM DESCRIPTION FUNCTIONAL PARABOUS- PUNCTIONAL PUNCTIONAL PARABOUS- HAZANDOUS- PAILURE HODE (IAZAND RELEASE DE DESCRIPTIONAL PARABOUS- HAZANDOUS- HAZ			MISS	SSOI	(8)	. arion
MAME: (Stub-system) HEADS-UP-DISPLAY CONSOLE  DMG. NO./REV.: 620310  ITEM DESCRIPTION FUNCTIONAL PARABOUS- PUNCTIONAL PUNCTIONAL PARABOUS- HAZANDOUS- PAILURE HODE (IAZAND RELEASE DE DESCRIPTIONAL PARABOUS- HAZANDOUS- HAZ		š	FEM	DAMAG	3	MUNIC
MAME: (Stub-system) HEADS-UP-DISPLAY CONSOLE  DMG. NO./REV.: 620310  ITEM DESCRIPTION FUNCTIONAL PARABOUS- PUNCTIONAL PUNCTIONAL PARABOUS- HAZANDOUS- PAILURE HODE (IAZAND RELEASE DE DESCRIPTIONAL PARABOUS- HAZANDOUS- HAZ		FECT	SYS	SSOI		T NO.
DMG. NO./MEV.: 620310  ITEM ITEM DESCRIPTION PROCESSIBLAY CONSOLE  NO. OPERATION, FUNCTION) HAZARDOUS- PENCTIONAL FUNCTION) HAZARDOUS- PENCTIONAL FUNCTION) HELBIAN HORE OPERATION, FUNCTION)  (1) (2) (3) (3)		8	NNET	MUCNI	(3)	0 0
DMG. NO./MEV.: 620310  ITEM ITEM DESCRIPTION PROCESSIBLAY CONSOLE  NO. OPERATION, FUNCTION) HAZARDOUS- PENCTIONAL FUNCTION) HAZARDOUS- PENCTIONAL FUNCTION) HELBIAN HORE OPERATION, FUNCTION)  (1) (2) (3) (3)			BRSO	FIAES	1	2, 9, 7, 8, 7, 7, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
ITEM DESCRIPTION, PUNC. (2)  (1)  (2)  (3)  (4)  (5)  (5)  (6)  (6)  (7)  (8)  (8)  (9)  (9)  (1)  (1)  (1)  (2)  (3)				FAILURE MODE (HAZARO RELEASE MECHANISM)		4 / 8 / 4 / 8 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1
S S S	(Sub-system)		ITEM DESCRIPTION	COMPONENT, WOUS OF OPERATION, FUNCTION)	(3)	AND THE PERSON OF THE PROPERTY AND ADDRESS OF THE PERSON O
	, M. P		ITEM	<u>.</u>	Ξ	

NOTE: Hazard Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Harginal; IV-Medilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rasonably Probable; C-Occasional; IN-Remote; B-Extremely Improbable;
F-Improssible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE:

(Svb-system) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.:

NAME:

Page xix of 113

								NAEC-91-7	958
COMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)			<b>9</b> -	0 2			
IIAZARD B.,	PROBABILITY OCCURRENCE	(13)	_	1731	1W1P19	1A1732/ 1W1PEO			
1 (7	Troiticad Eval Granh)	(11)		<b>U</b> /	•	<b>(</b>			
PAILURE :	EATDETEC YE ROTAREGO	(10)	_						
ION	POTENTIAL	6)	_ 		·	<u> </u>	7		<u> </u>
MISSION	SSOT	8	-		790			<del></del>	 ≧
	DAMAGE	3	-		99				CONSOLE CONTROL PANEL
EFFECT ON:	SSOT	(9)	-		ぇ	ند	370		3108
NEI BE	MUCNI	3	- }	1	18	7' 20 C	620370		§
BERSONNET	TIAES	€	- (	1141	CONTROL PANGL	C	2		PIGURE 13.
	PAILURE MODE (HAZARD RELBASE MECHANISM)	(3)	_ [						
ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)							
ITEM	ġ.	3							<u> </u>

NOTE: Hazard Loval, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic) II-Critical; III-Harginal) IV-Neoligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Propent; B-Easewonably Probable; C-Occasional; IP-Nemote; E-Extremely Improbable;
F-Improssible)

35 (A-19)

(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

Page xx of 113	-	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	SW/TCH
	EFFECT ON!	THE CHANTEL SYSTEM MECHANISM)  THE CHANTEL HODE  THOSE	-	AC CONTROL  JE UNIT & JH  ELECTA.  LAMP  L
DMG. NO./REV.: 620310		ITEM ITEM DESCRIPTION TO THE PUNCTION OPERATION, FUNCTION) (HAZAR MECH	(1) (2)	

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

A STATE OF THE PROPERTY OF THE

(Sub-system) HEADS-UP-DISPLAY CONSOLE TABLE:

NAME:

UNIT 1

•

620310 DMG. NO./REV.:

Page xxi of 113

											_	NAEX	-91-79	58	
	COMPENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)			•	DELAYED AC)	W AUX BLECTA)	CONTROLLED BY THERMO.	TEMP	SENSOR CONSULE		TENIP. SIBC OF SENSON	( 3 wine)		
	YTLII SASORY SONSKNIOOO	(12)	•				~o)	<u> </u>						_	
(	CLASCIFICATION LEVEL	(11)				אשא איאא ביטא היאא	8	MGA TER "ON"		*,04G			SWITCH		
FAILURE	DETECTAB BY NOTAREOR	(01)		(826029		MA:N .00	00			HENTUR CARTRIDUC ( +23885)			ار	_	
MISSION	POTENTIAL ESOJ	(6)		رف		189	280	6 S Q		37E)			INTERIOCI	-	ATION
	SSOT	(8)				0	7	0		7 7			ें इ	_	IDIFIC
EFFECT ON:	DAMAGE	(1)		9/4/	<u> </u>	0	-	-				. /	18	_	DEICH
RFFEC I SY	SSOT	(9)		1	/ A16 TB/	1				_	~	}	"	-	CONSOLE DESIGNIBILICATION
E PERSONNEI	YRUCNI	(2)	_		<u>,</u>					_ _	41167			-	
3434	FIAES	€	_			0 6				E 97, TCH				_	PIGURE 15.
HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		٠,		8,4148	* ( '' " ) ' " "	`, }	*(101) 18-	OFF PEDESTAL	(OBSTRUCTION				514
ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	73 ×	AC/AC			* E.		* CB	ř		* 101138	,	_	
ITEM	NO.	(E)				· · ·			· · ·			•			

NOTE: Mazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neuligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Ressenably Probable; C-Occasional; D-Memote: E-Extremely Improbable;
F-Impressible;

37 (A-21)

SYSIEM
CONSOLE
O LSO-HUD
MK1 MOD
AMALYSIS
SAFETY
- S. SIEM
ANALYSIS
& EFFECTS
RE MODES
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M )	UNIT 1 (Syb-system) HEADS-UP-DISPLAY CONSOLE	NO./REV., 620310 Page XXI.bf.1.3	EPPECT ON: FAILURE - HAZARD	PERSONNEL SYSTEM MISSION M 2 2 2 3	HECHAND RELEASE LOSS LOSS LOSS LOSS LOSS LOSS LOSS LO	(2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)	1781 1794 O-5V SCALE 12LUNINATION	J4 > 1 AE GULATOR 1783 1 A3 - 1A9	AUXILIARY BOARD	±15,+12,+8,-6 10+781 COMM	+ 181313 A • 1A1738	 19- 184 181+ 181- 181	116112 1A1251 SII-11AE 1A9 SII-RIGI	INIESI INEH SIE-IAT AS-IAB	٩	01011-410 B 5011-410 1011-410	CONTROL SY-INE SIS-IA9	347-11123	FIGURE 16. DC POWER REGULATORS
DWG. P DWG. P DWG. P DWG. P	•	DMG. NO./REV.		_		(1)			•			 		·		····		<del></del>	

Water Marine

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 LSO-HUD CONSOLE SYSTEM NAEC-91-7958

TABLE: UNIT 1

NAME: (Svb-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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NOTE: Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.2.1 (I-Catastrophic: III-Critical: III-Verginal; IV-Nechigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 9-leasonably Probable; C-Occasional; D-Renote; B-Extremely Improbable;
F-Ingressible)

Library Day William

(FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM UNIT 1

TABLE:

MAEC-91-2958

Page xxivof 113 (Svb-system) HEADS-UP-DISPLAY CONSOLE Þ 620310 DMG. NO./REV.: NAME:

58					
	-	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	100,000 (20)  400,000
	HAZAKU		YTLILEASON DANNIOO	(12)	6.3 V.A.C.  XMFR  WV. A.S.  WTENSITY CONTROL
-	١	Ŋ	TYADITIEZAID ZVZI OSAZAH)	(11)	7, 7
	FALLUKE	ITE	DETECTAE BY OPERATOR	(10)	6.3 x x x x x x x x x x x x x x x x x x x
		MISSION	POTENTIAL ROSS	(6)	(5,8637)  HUD GRT INTENE
	_	_	ross	<b>e</b>	\$6032 (5637) (5637)
	EFFECT ON!	SYSTEM	DYMYCE	(7)	(68033)
	EFFE			(9) (9)	3-
		PERSONNEL	TIAES	9	4,67 Sussit
-	HAZARDONS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	( TO RIZ
		ITEM DESCRIPTION		(2)	70 CRT ELAMBUT 79.5 74 75, 74 75, 74 75,
		ITEM	ç.	3	
					40 (A-24)

NOTE: /Hazard.Leval, Column 11, pet MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; B-Extremely Improbable; F-Ingressible;

(FALLURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 1

(Svb-system) HEADS-UP-DISPLAY CONSOLE

NAME: (Svb-system) HEADS-DMG. NO./REV.: 620310

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	_												MA	EC-91-	7958	<u> </u>
	SINCABREMENTO CO - STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)				COMBINER					7.50	Y SM SK		MENT REPLECTOR	
HAZARD		YTT.TT.B.ABORT EDVENNICOO	(12)	_		****	-					, , , , , , , , , , , , , , , , , , ,		TUC PROJECTION LAKIN		
•	(T) (Qf)	TNOTTESAD SVSI OKASAH)	(11)	_		MY LAR		<b>小</b>			量	4		PROJE Annin		
FAILURE	371	DETECTAB BY OPERATOR	(10)				1-								_	<u> </u>
	TON	POTENTIAL SZOJ	(6)	_				ý	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	(111)				7 7 7 %	•	— <u>2</u>
IL	MISSION	SSOI	9	_			13	787					'n	DE	į ·	_ Cet 7
ON	SYSTEM	DYMYCE	3	_	139		4	)		(m)	4 16		( A S)	HUD DEFL. Andrifter	•	- SPLAY
EFFECT	SYS	SSOT	9	_	NODE		4		11		YOKE YOKE		•	J E	1	— —
E	NE	XXOCNI	3	-	Ċ		Ľ	`	11_			_			<del></del>	HEADS-UP-DISPLAY CRT AND YOKE
	PERSONNET	TIAES	3	- · _				<b>.</b>							•	
		FAILUNE HODE (HAZARD RELEASE MECHANISM)	(3)		(	100 Y 80 C		F12018NT	V1080				15.7 D C.R.T	PLAY BRO		FIGURE 17-3.
NOTEGIOUSING WHELE		UNCTION)	. (2)		+(1)	100 m							AU H	74810		
TTEM	: :	ž.	<b>a</b>													

Hazard Lowely, Column 11, per MIL-SYD-882A, para. 5.4.3.1 (I-Cetastrophic; II-Critical; III-Marginal; IV-Neuligible) Hazard Probability, Column 12, per MIL-SYD-882A, para. 5.4.3.. (A-Frogment; II-Rassomably Probable; C-Oxxusional; In-Ramote; E-Extremely Improbable; F-Impressible; MOTE

41 (A-25)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

(Svb-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE:

MAEC-91-7958

THE DESCRIPTION HAARDOUS-  THE DESCRIPTION PRINCIPLE HORE  (COMPONENT, MODE OF PRINCIPLE HORE  (COMPONENT, MODE OF PAILURE HORE  (RAZAND RELEASE FM PR	FAILURE - HAZARD	30 CE	COMPENSATING PROVISIONS OPERATOR CACCIDENT PREVENTION MEASURES CHASTING PROVISIONS OPERATOR CHASTING C	(10) (11) (12) (13)	* D * S + 158/8/	1918 (A) E36 (A) S	(A) +	Synan, Sy	SIGNAL APPLIED "	CRT & PROJECTION LAMP TO ERMIT INTENSITY ABJUSTHENT  11-11FIL OF ACTUAL ACLS LOCK-ON
188 - 189 -	EFFECT ON:	PERSONNEL SYSTEM MISSION	TYLLATOR  SOT  SOT  INDUM  SOT  INDUM  THAS	(4) (5) (6) (7) (8) (9)	1,018.51	HUD CRT DISPLAY	ones aunge (18)	1 158/6/	* * * * * * * * * * * * * * * * * * *	UD 9CALBS-ON/OFF HUE
				(2)			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9/0/	19781 -	* 191751

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Neuligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Impres: ## F-Impres:

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

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UNIT 1 TABLE:

(Svb-aystem) HBADS-UF-DISPLAY CONSOLE HAME:

620310 DMG. NO./REV. 1

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COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS COMPENSATING PROVISIONS CALLER (ACCIDENT PREVENTION MEASURES; CALLER CONTROLS)	(11) (12) (13)	1415 1400 YONE 519038	NAEC-91-
LOSS NOT LOS	(8) (6) (8)	95 (620392) UD OEFL.	+ 200
DYWYCE ES CO ON THE CO ON	(4) (5) (6) (7)		
HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	788. 788. 6 AN POWER	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	(A24) (M4) (CA7) (CA7) (CA7) (CA7) (CA7) (CA7)	
ITEM No.	3		

NOTE: Hazard Lewel, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critica!; III-Marginal; IV-Menligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probable; C-Occasional; I-Remote; E-Extremely Improbable;

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

(Sub-aystem) HEADS-UP-DISPLAY CONSOLE TABLE: NAME:

620310

DMG. NO./REV. 1

UNIT 1

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	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)		(13)	***/	4			RD 733'Y.							
- HAZARD	3	PARTITION OF THE PARTITION OF T	(12)	£5.€/				HOTHER BOARD	898029)	CRT PROTECTION	PANEL	3			_
FAILURE - II	NO:	YE OPERATOR THOUSTOND THOUSTOND	(11) (11)	ጽድ/ -				70		Rr PR	FRONT PANEL	SYNCHRO			- - - -
Ba .	MISSION M	LOSS DETECTAL BY DETECTAL BY	(6) (8)	. 0 . 681		3/6/	(620361)			28	44	85			- -
EFFECT ON:	SYSTEM P	LOSS	(6) (7) (	(A 20		(	9)					J	es S	ES	
	PEPSONNEL	LIVES	(4) (5)	, s , s , s						POWER	SPARE	BIGNAL	MODULES	MODULES	_
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MRCHANISM)	(3)	BNTENDER	<del>-  </del>					5	S S	53	\$ 5	55	
		(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	ומוצוו	IMIRJE	INIR38	(AIRS#	10/835			, F25.71		IAIR38		
	ITEM	ġ	Ξ									•			

. ..

..... NOTE: Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neuligible).
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Remonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Impropriately.

... Side Military

(FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK) MOD O LSO-HUD CONSOLE SYSTEM UNIT 1

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MAEC-91-7958

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

TABLE:

DMG. NO./REV.: 620310

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TEN MISSION  THE M	RECOMMENDATIONS; TING PROVISIONS REVENTION MEASURES TY CONTROLS)	(13)	F. F	
LOSS LEATING SECTION OF THE PROPERTY OF THE PR	COMPENTS; COMPENSA (ACCIDENT P SAFE		10"CONCAVE SPUREICAL MIREUR  16" FOCAL LENGTII  20% REFLECTANCE  30% REFLECTANCE  70% TEAM-MISSION  CEEN FRIER  HAT REFLECTOR  DIFFUSER, JINIS SURFACE  "ETTICLE OF SCALE, FINIS SURFACE	
LOSS IN SECTIONS OF SECTIONS O		(13)	10° CONCAVE SPIER  10° CONCAVE SPIER  30° REFIER  70° REFIER  10° CONCAVE SPIER  10° FOCAL LENGTHI	
E SEOL LAITWATON SEOL SEOL		3		
SSOI	DETECTABL BY SACTABL	(10)		TAMP ASSEMBLY
	LOSS	6)	.425	
DAMAGE E	SSOI	(8)	-	
<u> </u>	DAMAGE	3	_	IND PROJECTION
SSOJ SSOJ SPAMAG		(9)	_	
INJORY FE	MUCHI	(5)	_	
		3	_	FIGURE 19.
HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)	PAILURE WODE (HAZARD RELEASE MECHANISM)	(3)		-
ITEM DESCRIPTION (COMPONENT, MODE OP OPERATION, FUNCTION)	(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	2 2 3 A VIEWER POSITION	
NO.			•	

//dazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
//kizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.7 (A-Frequent: B-Resembly Probable; C-Occasional; ID-Remote; B-Extremely Improbable;
// F-Improbable;
// F-Im 

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(A)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.: 620310

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58				
	COMPRESS RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	. (13)	Is a diappearing circular arc segment Range a gnals are provided by the  10. When the alforate is more than one nearly complete irrole suddenly appears andins via bles and so on until at about diameter at all times.  III D When failures occur that affect loss of only the HUD display of range information, the LSO will use the lower console range display When a failure occurs that disables both displays, the LSO will depend on his visual contact with the alrorate and his experience to judge the range of the aircraft. This failure mode would therefore course no problem during a given recovery period and it would be corrected before the next one.
HAZARD	9.	YTLIIAASORU CNERSISCO	(12)	appearing of the allowed and t
1	E 29	TUCOTTICZAJO SVZI OTANAH)	(11)	Range s 18. Who almarly c almarte diamete
PAILURE	371 371	DETECTAB BY OPERATOR	(10)	o edge. nector lles, a constant k
	ION	POTENTIAL S201	(6)	ombline res
	MISSION	SSOI	(8)	MUD Of t M227 of,
Š	SYSTEM	DYNYCE	(7)	a allo allo allo allo allo allo allo al
EFFECT ON:	81.8	SSOI	(9)	via via appr rtion
<u> </u>	PERSONNEL	YMUCNI	(2)	
	PEPSC	FIAES	(4)	one (1) or still one of the or
9700	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	up). The range data supplease the CV within Dne (I consols as varying Cr st. onsols as varying Cr st. onsols as varying Cr st. on a lice remains a Colf wage (while - A/C within lnm)  1) Loss of 1A24  inage generator rator printed circuit board output,  11) Loss of HUD  CRT subsystem,  11) Loss of input stimulus to 1A24 from consols consols consols to last from consols to aignal breakdown in cable wa227 and/or Signal  Junction Box (Unit 4A1),
	ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FUNCTION)  (2)  Range Indication/Heads-Up-Display ( commencing when returning aircraft commencing when returning aircraft		Range Indication/Heads-Up-Display (commencing when returning aircraft SPN-42 radar and are fed to the HUD natical miles away, the circle does on the display. At 0.5 miles, half 0.01 miles, the circle disappears of the cir
	ITEM NO.		ε	46 (A-30)

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible) NOTE

A THE PROPERTY.

46 (A-30)

#### (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 LSO-HUD CONSOLE SYSTEM NAEC-91-7958

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TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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_				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFRTY CONTROLS)	(13)	•
HAZARD	30	THE STATE OF THE S	(12)	
1	E 2	itaoitieza.d Evel Grasah)	(11)	·
FAILURE	<b>37</b> 1	DETECTAL BY OPERATOR	(01)	
	MISSION	Potential Potential	(6)	
	MIS	SSOT	(8)	
S. S.	SYSTEM	39ANAG	(7)	
EFFECT		SSOI	(9)	
8	PERSONNET	YMUCNI .	(2)	
	PERS(	TIAES	3	
O TO COM A SA A SA	FUNCTIONAL	FAILURE MODE (MAZARD RELEASE MECHANISM)	(3)	iv) loss of inter- nal console circuitry paths from 18 to 1824 caused by open pin orimp/broken wire/high resistance pin connectors 181211 (Power) or 181213 (Signal) or intercon- nection within card cage back-plane 1812 (Signal) or intercon- nection within card cage back-plane 1812 v) Loss of DC power supply laput voltages to 1824 (HUD Display Board) and HUD CRT subsystems provided by Auxiliary Riectronics Box (Unit 2) through con- sole connector sele connector
	ITEM ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(coat'd)
			3	1.0

NOTE: Mazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional: N-Remote; E-Extremely Improbable;
F-Impressible)

West Bullion

47 (A-31)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

HAEC-91-7958

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE:

DMG. NO./REV.; 620310

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8				
•	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	This failure mode is detectable by the LSO when large incremental errors develop. Small errors are of little consequence to the LSO because of his visual contact with the aircraft in the approach. Small errors will ultimately be feterted through periodic calibrations and corrected with an appropriate maintenance action. If only the HUD display is affected in this failure mode, the LSO will use the console display.
HAZARD	<b>3</b> 0	TILLIEAEORY ENERGINECCO	(12)	
1	56.33	itaditisaad avai oraaai)	(11)	E
FAILURE	rs Pre	EATCETEC YE ROTARETO	(10)	M
	MISSION	POTENTIAL ROSS	(6)	-
	MIS	SSOT	(8)	
ĕ	SYSTEM	DYWYCE	(2)	-
EFFECT	L_	SSOI	(9)	
<u> </u>	PERSONNET	YRUUNI	(2)	-
	PERSC	FIAES	(4)	1
	HAIARDOUS- FUNCTIONAL FAILURE HODE (HAIARD RELEASE MECHAUISM)		(3)	vi) Loss of Eange 6 Ramp Motion Signal Con- dition circuit board 11.20 output displayed 1) Component malfunction on 11.24 PCB causing misinter- pretation of condi- tioned Range data, 11) Component malfunction of condi- tioned faisinter- pretation of condi- tioned displayed ficorrect aignal con- dationing of input DC stimulus (varying DC voltage) from SPN-42 rader,
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont.4) &)
	ITEM		(1)	1.0

Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Magligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

48 (A-32)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

BLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.: 620310

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		<del></del>		NAEC-91-7958	_
	COMMENTS; R. COMPENSATI		(13)	•	
HAZARD	30	YTLLIEAGORY CMENSICOO	(113)		
•	(T	eval grazaen	Œ	·	
FAILURE	27 271	DETECTAI BY IOTAIGO	(10)		
	MISSION	POTENTIAL POTENTIAL	6)		
	SIH	SSOI	(8)		]
r ON:	SYSTEM	DAMAGE	(2)		
EFFECT	1. 1	SSOT	(9)	·	֡֝֝֝֝֝֝֝ ֡֡֡֡֡֡֡֡֡֡֡֡
9	PERSONNEL	MOCNI	(3)		
	PERS	TIAES	Ξ		
HAPADROUIG	FUNCTIONAL	Pallur Mode (Hazard Release Mechanism)	(3)	tical voltical voltages to 1824 and 1820 from Awxillary Blectronics Box (Unit 2) and 184.	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(coat'4) b)	
	ITEM	NO.	(B)	1.0	

Hazard fevel, Column 11, par MIL-STD-882A, para. 5.4.3.2 (A-Frequent: II-Critical; III-Margina): IV-Nayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: B-Research) Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible) NOIE

49 (A-33)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-IIUD CONSOLE SYSTEM

MEC-91-7958

UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAMB:

620310 DWG. NO./REV.:

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TYPEN PESCENTPTION   PUNCTIONAL PUNCTIONAL   PUNCTIONAL	UB - HAZARD	(HAZARO LEVEL)			on its glide-plope path to its final touchdown point.  a raige from 200 feet per minute to 1500 feet per  -scals at each end of the scale for descent rates  which provides varying analog stimulus of 0-10 VDC	
The ROD stale on the transport of the ROD stale on the transport of the tr	FAILURE	1	XΞ	(10)	galde-sl galrom 2 at each provides	•
The ROD State of Total System to The Rob State of Total Total System to Total		NOIS	POTENTIAL LOSS		on its	
The ROD s ILL approach to the Rob s till approac	_	MIS	SSOT	8	play play	
		STEM	SOAMAG	-	t di it di ilight	
	PPEC.	$L_{-}$	SSOT	9	ROD S Proac 38.	
TTEN DESCRIPTION  (COMPONENT, MODE OF PAILURE HODE (MAZARD RELEASE PAILURE HODE (HAZARD RELEASE)  (A)  (A)  (A)  (A)  (A)  (A)  (A)  (	西	NNE	XXOCNI	(2)		
ITEM DESCRIPTION  (COMPONENT, MODE OF PRILORE HODE (HAZARD RELEASE HECHANISH)  (2) (3) (3)  (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4		PEPS(	TIAES	Ξ	t as	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)  Rate of Descent (80D) Indication of the rate of descent (81nk rate) of The NOD scale is located on the ext minute of aircraft descent during to outside of the range. This display corresponding to 0-2000 feet per m		FUNCTIONAL	FAILURE HODE (HAZARD RELEASE MECHANISM)	(3)	Heads-Up-Display (keeps and a strong	<b>₹ ₹</b>
		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Nate of Descent (NOD) Indication on the rate of descent (sink rate) of The NOD scale is located on the ext minute of aircraft descent during a outside of the range. This display corresponding to 0-2000 feet per mi	

50 (A-34)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-IND CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT ]

NAME: (Sub-aystem) HEADS-UP-DISPLAY CONSOLE

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_	_			NAEC-91-7958
	COMMENTS, RECOMMENDATIONS, COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			
HAZARD	æ.	CCTRRENCE PROBNETTELL	(12)	·
1	(E 20	Teotheal Svai Grasse)	Œ	·
FAILURE	27 371	EATCETEC YE YOTAREGO	(10)	
	SION	POTENTIAL ROSS	(6)	
	MISSION	SSOT	(8)	
NO.	SYSTEM	DAMAGE	(7)	
EFFECT		SSOT	(9)	
<u>a</u>	PERSONNET	<b>YAUUNI</b>	(2)	
	PBRS(	TIAES	(+)	
SHOUGHER	HAZARDOUS- FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM)		(٤)	1v) Loss of in- ternal con- sols circut- try paths from 18 to 1A24 caused by open pin crimp/broken wirs/high resistance pin con- nection in connection in tistance 1A12.3 (Signal) or intercon- nection within card case back-plane 1A12.0 c.con- nection within card case back-plane intercon- nection within card case back-plane 1A12.0 c.con- nection within card case back-plane intercon- nection within card case back-plane intercon- nection within Blaplay Board) and HUD CRT sub- systems pro- vided by Auxiliary Electronics Electronics
	ITEM DESCRIPTION (COMPONENT, MODE OP OPERATION, PUNCTION)			(cont'd)
	ITEM	NO.	(1)	2.0

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; ID-Remote; E-Extremely Improbable;
F-Impressible) NOTE:

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### (EALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

a: UNIT 1

TABLE:

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.: 620310

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58		_			
		SNOTE STATEMENTS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	This failure mode is detectable by the LSO when large incremental strong acrors are of little consequence to the LSO because of his visual contact LSO will use the console display.
	HAZARD	<b>1</b>	TILITEARORY DAGNIUM	(12)	<u>.</u>
	•		IVADITICZAJO SVEI ORASAH)	(11)	<b>.</b>
	FAILURE	37 37	EATTECTAB SE ROTAREGO	(10)	×
		MISSION	FOTENTIAL POTENTIAL	(6)	•
	-	MIS	ross	(8)	•
	NO F	SYSTEM	DAMAGE	(7)	
	BFFECT ON:		rozz	(9)	
	_	PERSONNET	YAUCHI	(2)	•
		PRP	SZAIT	3	
		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	through con- sole connector J4 (DC power) sassembly 1A4 (Regulator Board ass'y, and the 115 VA-C input ("AC On"), V) Loss of range & ramp sotion signal Conditioning circuit board 1A19 output. b) Incorrect Value displayed 1) Component malfunction on 1A24 PCB causing mis- interpre- tation of conditioned range data, 11) Component salfunction on 1A19 conditioned range data, 11) Component salfunction on 1A19 conditioned range data, 11) Component salfunction on 1A19 confect signal con- ditioning of input DC
	ITEM ITEM DESCRIPTION (COMPONENT, MODE OF NO. OPERATION, FUNCTION)		(2)	(cont'd) a)	
			ε	2.0	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Renote; E-Extremely Improbable;
F-Imposible; NOTE:

52 (A-36)

#### (FALLURE MODES & FFFECTS ANALYSIS .. SYSTEN) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM MAEC-91-7958

TABLE: UNIT 1

NAMR: (Sub-aystem) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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The state of the s

				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	
HAZARD	.ao	PROSABILLITY CONTRIBUTION	(13)	
	(T)	INDITIESAD EVSI GRASAH)	(11)	·
FAILURE	21 371	DETECTAL BY COPRATOR	(01)	
	NOI	POTENTIAL POTENTIAL	(6)	
	NOISSIM	ssot	(8)	
ON:	SYSTEM	DYMYCE	(2)	
199		SSOT	(9)	
20	PERSONNEL	MUCHI	(5)	
		FLASS	$ \varepsilon $	
-SINOLOGE 4H	FUNCTIONAL	FALLURE MODE (HAZARD RELEASE MECHANISM)	(3)	(varying DC voltage) from SPN-42 radar, 1111 Loss of oritical voltages to 1124 and 1139 from Auxiliary Electronics Box (Unit 2) and 1144.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) b)
	ITEM		(0)	o i

NOTE: Mazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Rassonably Probabie; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improssible)

53 (A-37)

## GAILUNE MODES & EFFECTS ANALYSIS - SYSTEM) SLFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM NAEC-91-7958

UNIT 1 TABLE (Sub-eystem) HEADS-UP-DISPLAY CONSOLE NAME:

620310 DMG. NO./REV. 1

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58	_				
		COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)		(13)	went due to the ship's trim. The ramp motion is displayed off-scale if the scale limits are acceded. The input located on the console selects the ship's trim which costion during landing operations is a high ramp from mp is much more dangerous than a low ramp since the latter an a ramp strike.  X III D When failures occur that affect only the HUD display of ramp motion/trim information, the LSO will use the console display. When a failure occurs that display. When a failure occurs that display alarm in an auxiliary instrument facility (base console) in the LSO work station. A real light is illuminated for a ramp condition causing a 7 to 3 ft. hook to ramp clearance and an audible alarm sounds when the clearance is less than 3 ft. This failure mode would, therefore, not significantly affect asfety during a given recovery period and it would be corrected before the next one.
	HAZARD		YTT TTEASORY DARWINGOO	(12)	facsimilaria de scale
	•		eval Grasal) Eval Grasali	(11)	cale on the NUD is a faceimil move of fraction if the scale sitch located on the console samp position during landing cyntamp is much more dangerously mean a rarp strike.
	FAILURE	271 271	EATCETEC YE YE OTAKEGO	(10)	
		MISSION	POTENTIAL SECT	(6) (	
	ä	$\vdash$		(8)	tion/frim y fixed disolater will conentry s dangerous cale. A h he former x
-	EFFECT ON:	SYSTEM	DAMAG	(7)	
	EFFE	<u></u>	SSOI	(9)	
	_	PERSONNEL	INJOEK	(2)	of the R. ter (SFHC)  WOTE: The filter on ircraft, w
		PEPS	TIAES	€	with the part of t
		HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(13)	ramp display (RD). The ramp displacement due to sea laft of the combine of the sea Harmonization Computer (SFHC) on the ramp scale. NOTE: The indicated by a rec filter of to the pilot and sircraft, No indication x - 1) Loss of 1A24 image generator printed circuit board output,  1) Loss of input standard output,  1) Loss of input standard from console (Signal) due to signal breakdown in W27 cable and/or Signal Junction Box (Unit 4A1),
	NOTITE OF STATE OF ST		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		Name Notion/Tris Indication on the Heads-Up-Display (ill indicator display displaying sum of ramp displacement on the vertical scale at the astreme left of the combination along a from the Ship Harmonization Computed displayed (without ramp motion) on the ramp scale.  +10 feet to +20 feet. This range is indicated by a recommence to +20 feet. This range is indicated by a recommence a hard landing and less dange; to the pilot and a hord landing and less dange; to the pilot and a hord landing and less dange; to the pilot and a hord landing and less dange; to the pilot and a hord landing and less dange; to the pilot and a seasons a hard landing and less dange; to the pilot and a hord landing and less dange; to the pilot and a hord landing and less of HUD CRT subsystem,  11) Loss of HUD CRT subsystem,  12) Loss of HUD CRT subsystem,  13) Loss of HUD CRT subsystem,  14) Loss of HUD CRT subsystem,  15) Loss of HUD CRT subsystem,  16) Loss of HUD CRT subsystem,  17) Loss of HUD CRT subsystem,  18) Loss of HUD CRT subsystem,  19) Loss of HUD CRT subsystem,  11) Loss of HUD CRT subsystem,  12) Loss of HUD CRT subsystem,  13) Loss of HUD CRT subsystem,  14) Loss of HUD CRT subsystem,  15) Loss of HUD CRT subsystem,  16) Loss of HUD CRT subsystem,  17) Loss of HUD CRT subsystem,  18) Loss of HUD CRT s
		ITEM	9	3	0.0

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; TV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) NOTE:

i

54 (A-38)

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, por MIL-STD-882A, para. 5.4.3.2 (A-Froquent; Beliasoubly Probabie; C-Occasional; D-Ranote; E-Extremely Improbable;
F-Impressible)

Marie Marie

## (FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 1

NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

HAEC-91-7958

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The second second distinct and the second 
	_			
	SHOITAGNAMMOOGA STNAMMOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	
HAZARD		YTTII AABORG	(11)	
,	100	ITADITIEZAJO SVSI GRASAH)	(11)	
PAILURE	<b>37</b> 1	EATCETEC YE ROTAREGO	(01)	
	NOIS	POTENTIAL LOSS	(6)	·
	MISSION	SSOT	(8)	
3	TEM	DAMAGE	(7)	
EFFECT ON:	SYSTEM	SSOT	(9)	
38	NNET	RECONI	(2)	
	PERSONNEL	LIVES	(3)	
		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	internal consola carcuitry paths from JB to 1024 caused by inter- connection within card cage back- plane 1012 including connector including connector including cansed by power supply input vol- tages to in24 (ind) insplay
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(cont'd) b)
	ITEM		3	o i

55 (A-39)

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(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS, MKL MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE, UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

8					
	COMMENDATE RECOMMENDATIONS,	CONPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)		
TILITAGON TO YILITAGON TO YI			(11)		
	100	TINOTTICSAD EVS.I GEASAH)	(11)		
FAILURE		DETECTAE BY OPERATOR	(10)		
	MISSION	POTENTIAL LOSS	(6)		
	MIS	SSOI	9		
EPFECT ON:	SYSTEM	DYMYCE	3		
		SSOI	9		] ]
M2	PBREUNNET	INDOK	(3)		
	PRRE	FIASS	€		
GINCAGASAN	FUNCTIONAL	FAILURE MODE (HARAND RELEASE MECHANISM)	(3)	w) Board) and HUD CRT subsystems provided by Auxiliary Electronics Box (Unit 2) through consols consols consols consols with the consols consols consols consols wassembly ladd (Rsguillator Board Assembly, and the 115 vA-C input ("AC ON"), will Loss of trim information due to open or shorted momentary switch loss of range & r	output
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(coat. d)		
	HEH	<u>.</u>	ε	о. :	
				56 (A-40)	_

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Ressonably Probable; C-Occasional; D-Manute; E-Extremely Improbable;
F-Impossible)

56 (A-40)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 150-11110 CONSOLE SYSTEM

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MAEC-91-7958

TABLE: UNIT 1

MAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	when failures occur that affect only the HUD display of ramp motion/trim information, the LEO will use the console display.  When a failure occurs that displays the LEO will dapend on the hook to ramp alarm in an auxiliary instrument facility (base console) in the LEO work station. A red light is illuminated for a ramp condition causing a 7 to 3 ft. hook to ramp clearance and an audible alarm sounds when the clearance is less than 3 ft. This failure coantly affect safety during a given recovery period and it would be corrected before the next one.
HAZARD	8	ENCENTERIORS ENCENTERIORS	(13)	ed
1	<b>1</b> 20	inoriesae Svei Granei	(11)	<b>.</b>
FAILURE	371 371	DETECTAB BY GOTARATOR	(01)	×
	MISSION	POTENTIAL POTENTIAL	(6)	•
	MIS	SSOT	8	ı
3	SYSTEM	DYMYCE	3	·
EPPECT		SSOI	9	•
M	PERSONNE	RECORI	3	1
	PEPS	LIVES	€	-
O DO GOLD AND AND AND AND AND AND AND AND AND AN	HAZARDOUS- FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	viii) No trim selection due to shorted or open control selection or trol selection or serroneous readout.  1) Component malfunction on 1/24 PCB causing misinterpreselection of conditioned ramp data,  ii) Component malfunction of conditioned causing misinterpreselection of conditioned ramp data,  iii) Component malfunction of conditioned ramp data,  iii) Component malfunction of conditioned ramp data,  iii) component malfunction of conditioned ramp data,
	ITEN DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont.d)
	ITEN NO.		(1)	o r

Hozard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reservably Probable; C-Occasional; I'-Remote; E-Extremely Improbable;
P-Improbable; NOTE

57 (A-41)

	(FAILURE MODES & EFFECTS ANALYSIS - SYSTEN.) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYST	YSIEM
TABLE:	1. UNIT 1	
NAMB :	NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE	
DMG. NO	DMG. NO./REV.: 620310	Page 13 of 113

11   12   13   14   14   15   15   15   15   15   15	<u> </u>				
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION		COMMENTS, RECOMMENDATIONS,	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	AZARD	30	YTLL I E A BORY ED A BRITTON	(12)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	1	(Z	TAOTTESALD EVEL GHASAH)	(11)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	FAILU	371	DETECTAB YE COPERATOR	(10)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION		SION	POTZUTIAL POTZUTIAL	(6)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION		MIS	SSOT	(8)	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	r on	STEM	DAMAGE	3	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	FFEC	L	SSOI	9	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION	90	ONNEI	XLOCKI	3	
ITEM   DESCRIPTION   FUNCTION   FAILURE   PUNCTION   POSTICION   POSTICION		PERS		3	
H. (1) 3.0 (1) 3.0	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	ii) (varying Dr voltage from ahip trim/haru-onization computer. iii) loss of critical voltages triming from huxiliary Electronical Box (Unit.) and 1A4.	
H. (1) 3.0 (1) 3.0	ITEM DESCRIPTION (COMPONENT, MODE OF OPENATION, FUNCTION)		(2)	(cont'd) b)	
		ITEM	<b>K</b> 0.	ε	e:

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Necilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Inpressible)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

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UNIT 1 TABLE: (Sub-system) BEADS-UP-DISPLAY CONSOLE

NAME:

620310 DMG. NO./REV.

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	ĝ				NAEC-91-7958		
	*SHOTTENDENDENDENDENDENDENDENDENDENDENDENDENDE	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAPETY CONTROLS)	(٤1)	presented by the location of an orizontal glidepath referenced datum. A n. To indicate to the observer that the when the loft/liv scale factor is in use. And position is an automatic (Auto) mode and nautical mile away, and a symbol scale factor displacement of the aircraft symbol is from the desirel glide slope. With the lof electronically generated aircraft symbol is console, the LSO can employ the Plat centerline monitor as an alternative line up and glide path indicator.	~ <u>-</u>		
HAZARD	æ	YTT.TT.EASTORY EDISHBILDDO	(11)				
1		TLOPIEZAD EVEL GRASAH)	(11)	antion is present and a horizonta division. To i te added when the The mird postion, the displaction, the displaction of the electron x III			
FAILURE	31	DETECTAB BY CPERATOR	(10)	antion is divisit re added . The etch. coraft is of the			
	┿	POTENTIAL POSS	(6)	info datu t per panel panel e for e al			
	MISSION	SSOI	(8)	is-up inforcence datum 10 for period a all a stront penel stront pene			
₹	тем	DYKYCE	(7)	up reference (v) and to fee wings and a illumination a drozeft is a drozeft is to the feet how far the the displanment of the feet how far the fisher feet how far the feet how far the fisher feet how far the fisher feet how far the feet how far the fisher feet how feet how far the fisher feet how fe	· · · · · · · · · · · · · · · · · · ·		
BFFECT	SYSTEM	SSOI	(9)		T		
8	NNEI	XXOCNI	(5)	The glide in the g			
	PERSONNET	TIMES	(3)	. The glid vertical li livision (fi mall direl ch on the l ymbol when ay. Or the y out of v			
- SIDOGE AR	HAZARDOUS- PUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(6)		tem,  111 Loss of in- put sti- mulus to 1124 from console connector 18 (Signal) due to sig- nal break- down in cable Will		
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	Glidopath and Line-Up langing on He ds-Up-Display (HUD) electronically generated aircraft symbol relative to a choice of two scale factors is available, 30 feet per d 30 ft/div is in use, the aircraft is represented as a since a selection is made with a three-boatlon rotary swit produces a scale factor of 30 ft/div for the aircraft is produced a scale factor, the symbol can be driven completed determined by analog DC signals from the SPN-42 radar.  a) No aircraft symbol  i) Loss of circuit board in24 cutput, tabeys-			
MO.		3	9;				

NOTE: Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Russonably Probable; C-Occusional. 'P-Runcte; E-Extremely Improbable;
F-Improsable;

William In Work

59 (A-43)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

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The second secon

B: UNIT 1

TABLE:

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) (13) (12)TO THE STATE OF - HAZARD TO YTLITIEAEORY (HAZARO LEVEL) PAILURE DETECTABLE
YE
SYOTARIAN <u>6</u> POTENTIAL POTENTIAL MISSION 6 (8) SSOI 3 BYSTEM EFFECT ON DYWYCE (9) SSOT EPEONNEI 3 INJUEX Ξ FIAER FUNCTIONAL FAILURE HODE (HAZARD RELEASE MECHANISM) Junction Box broken wire, power supply Unit 4A1), J8 to 1A24 caused by high resiscard case back-plane paths from connection Loss of DC input volconnection 1A24 (HUD Display tance pin or intercircuitry open pin tages to Internal console -uoo u nectors HAZARDOUSloss of vithin crimp/ and/or Signal 1112, 3 3 111) 7 (COMPONENT, MODE OF OPERATION, FUNCTION) 3 (cont'd) ITEM 3 **•** Š

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rensonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impossible) MOTE

WAS DEPARTED

60 (A-44)

## (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOI) O LSO-HUD CONSOLE SYSTEM

UNIT 1 TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE KAE:

DMG. NO./REV.: 620310

MAEC-91-7958

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					NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)		By experience, the LSO can visually detect the manfunction, and at a glance, it can then be checked against the PLAT centerline monitor.
- HAZARD		YTLII AABORG EMARKILOOO	(12)		24
	<b>10</b>	eval Orasan)	(11)		<b>1</b>
FAILURE	371 371	EATTECTAB YE ROTAREGO	(10)		×
	MISSION	POTENTIAL SEOJ	(6)		1
	MIS	SSOT	(8)		ı
8	BYSTEM	DAMAGE	(1)	·	1
EFFECT ON:	L	SSOT	(9)		ı
M	PERSONNET	YAUCHI	(2)		1
	PERSC	PIAES	3		1
000000	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	v) Board) and liub CRT subayatema provided by Auxiliary Electronics Box (Unit 2) through consols con- nector 14 (DC power), assembly lator Board Assembly), and the lis va-C input ("AC ON"),	b) Incorrect pos- ition of air- craft symbol with respect to datum lines or incorrect scale factors  1) Component malfunction on 1A24 PCB causing mis- interpre- tation of cditioned rangu data,
	ITEM ITEM DESCRIPTION (COMPONENT, MODE OF NO. OPERATION, FUNCTION)		(2)	(cont'd)	
			3	0.	

NOTE: Mazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginak; IV-Neyliyible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Rosewably Probable; C-Occasional; IP-Remote; E-Extremely Improbable;
F-Impossil.Le)

CHARLES THE PARTY

61 (A-45)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TOTAL STATE OF THE 
TABLE: UNIT 1

NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./RBV.: 620310

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	SHOULD BECOMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible) Para. 5.4.3.2 (A-Frequent; R-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
IIAZARD		YILIIAABORY Distriction	(12)		gligible)
•	(JI	TWOTTICSAD SVS.I GRASAH)	(11)		1; IV-Ne C-Occas
FAILURE	i	DETECTAR BY OPERATOR	(10)		-Margina robable;
	MISSION	POTENTIAL LOSS	(6)		ably P.
-	<u> </u>	SSOT	(8)		ritica
¥ 8	SYSTEM	DAMAGE	(2)		strophic; II-C
EFFECT	Ш	SSOT	(9)		phic;
<b>2</b>	PERSONNEL	INDONI	(2)		astro (A-Fr
	SHEPS	TIAES	3		1-Cat
HAIARDOUS- FUNCTIONAL FAILURE MODE (HAIARD RELEASE MECHANISM)		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	ii) Component malfunction on iA20 FCB causing in- correct signal con- ditioning of input BC atimulus (varying BC voltage) from SPN-42 radar.  iii) loss of critical voltages to iA24 and iA24 and iA24 and iA25 from Auxiliary Electronics Box (Unit 2) and iA4.	82A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible) -STD-882A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; D-
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) b)	liazard Low.1, Column 11, per MIL-STD-882A, para. Hazard Probability, Column 12, per MIL-STD-882A,
THE MA		ε	62 (A-46)	NOTE: IIA	

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	The reticle scale projection lamp is mounted on D combinar reticle scales (ramp motion/trim, descent, passing the light from a 50-tatt, 12.6 volt Ac lamp coduces a green scale lisplay of approximately 520 nano-sources in the green region are not of the same wave—  III D The likelihood of a projection lamp failure is extremely remote, because as a routine preventative maintenance measure, it will be replaced before the end of its rated life. If the attendant circuitry would fault, the LSO would have to depend upon the indicators on the console is an extremely improbable.  Coincident failure of the leade-up-likaplay and the Console is axtremely improbable.
HAZARD	30	YTT.IIIEAEORG DAGINILOOO	(12)	the min combiner wettele scales (remula by passing the light from a 50-valua produces a green scale lisplay bight bounces in the green region are of the CRY pointer is controlled by the cry pointer
	NO:	TIVOTHISZAD SVZI GYAZAH)	(11)	scale principle scilght front green i la cont la cont
FAILURE	21 311	DETECTAL BY TOTANISTO	(01)	The reticle passing the conduces a gree sources in the concess in the contest of the conduction of the co
	TON	POSS POTENTIAL	(6)	The Pass oduce cource of CRC .
	MISSION	SSOT	(0)	the lip county by passing py pass
ON:	SYSTEM	DYMYCE	(1)	for brain r. Brain strong pastry pastry
BPFECT	SYS	SSOI	(9)	filte the care the ca
B	NNE	INDON	(5)	reen cen.
	PERSONNER	SZAIT	3	
HAZ ADDOUGH.	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	rejection Lamp Circuitry 20361) and provides the both the both the calculation of the both the calculation of the control panel allowing sole control panel allow, intermandation of HUD combiner reticle scale lighting.  1) Loss of A-C input to commertion allower to commertion input to commertion input to commertion on/Off" connection in switch in a random lawl of propen winding in a random laws of proj. lamp intensity 6 possible information
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	The Heads-Up-Display Reticle Scale Projection Lamp Circuitry the back-plate assembly (1A26-Deg.680361) and provides the b line-up datum, glide slope datum). The reticle scale illumit through a heat deflector, a heat absorber, a diffuser and a meters. The pointer display is green; the CRT phosphor is y langth so that the pointers and scale illnes are not confused whose control is located on the composite control panel whose control is located on the composite control aittent, or lose of HUD combiner reticle scale lighting.  1) Loss of A-C input to common lis von pen "Scale On/Off"  control switch in variac  fill Shorted or open winding in a random lavel of pros. lamp intensity 6 possible information
	ITEM No.		3	o vi

Hazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Catical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.7 "A-Frequent; R-Tespebile; C-Occasional; ID-Remote; E-Extremely Improbable;
F-Impossible) NOTE:

63 (A-47)

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-IND CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.: 620310

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	COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES. SAFETY CONTROLS)	(13)	**
HAZARD	3 30	YTT.IT.8A80RT DVSR810000	(12)	
1	(Z)	TTANTTERATO TTANTTERATO	(11)	
FAILURE	1	DETECTAB BY OPERATOR	(10)	
	HISSION	POTENTIAL POTENTIAL	(6)	
	MIS	SSOI	(8)	
EFFECT ON:	SYSTEM	DAMAGE	(7)	
FFEC		SSOI	(9)	
	PRESONNE	YAUCNI	(2)	
	PRRS	FIAES	€	
	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	'washout',  iv) Open isola- tion diodes, fino unblank- ing controllopen relay coil or frosted on the HUD Pro- jection Lamp Board inilial (Dwg. 518667) or its ter- minal strip 1A137B1 causing low A-C input to transformer 1A11.  v) Shorted or open winding in trans- former 1A71 (12.6 VAC), vi) Open or nection on terminal board 1781 linking 1781 linking 1781 and the HUD projection lamp,
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd)
	NO.			o n 64 (A~48)

Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) NOTE:

V-XXIII BURNING

64 (A~48)

Hazard Lowel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Margine): IV-Neyligible;
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 'A-Frequent; B-Reservable; P-Occasional; P-Remote; E-Extremely Improbable;
F-Impropable;

NOTE:

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

UNIT 1 TABLE

(Sub-system) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.:

NAME:

NAEC-91-7958

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					NAEC-91-7958
	COMMENTS, RECOMMENDATIONS,	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAPETY CONTROLS)	(13)		
HAZARD		YTLITE/EORY CHERRICO	(12)		
	700 (E	ingothiczald Eval Grasah)	$\widehat{\mathbf{z}}$		
FAILURE	21 371	DETECTABLE  BY  COPERATOR	(10)		
	MISSION	POTENTIAL SECT	(6)		
	MIS	SSOT	8		
NO.	SYSTEM	DAMAGE	3		
EFFECT ON		SSOI	9		
2	PERSONNEL	MOCNI	(3)		
	PERS	TIAES	Ξ		
	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	vii) Open HUD pro- jection lamp (dwg. 519043) viii) Shorted or inoperative HUD ntensity control manual un- blanking function associated with 'Sat' or 'Test' to be con- stantly on.	
		OPERATION, FUNCTION)	(2)	(cont'd) b)	
178A		ý Ž	3	o vi 65 (A-49)	

65 (A-49)

NAEC-91-795

(FAILURE MUJES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-IND CONSOLE SYSTEM

NAEC-91-7958

UNIT 1

TABLE NAME:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.:

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58					
•	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			PLAM display. It operates when the aircraft is six and are fed to the Mulconsole as varying DC stimulus  - x III D When failures occur that affect loss of only the console display of range information, the LSO will use the redundant indication on the MUD. When a failure occurs that disables both displays, the LSO will depend on his visual contact with the aircraft and his experience to judge the range of the aircraft. This failure mode would, therefore, cause no problem during a given recovery period and it would be corrected before the next one.	
HAZARD	_	PROBABILIZY CKURWINZO	(12)	brates with the property of th	
		IDADITIEZAD EVEL ORANAH)	(11)	It operation the H	
FAILURE	371 371	EATCETEC YE ROTARETO	(10)	PIA displayes with the property of the propert	
	ION	POTENTIAL POTENTIAL	(9)		
	MISSION	SSOT	(8)	in at 6 mi in at 6 mi PN-42 rada e card caye	
ĕ ĕ	rem	DAMAGE	(1)	s below the line of 6 ml line of 6 ml line of 6 ml line of 6 ml line of 6 card cag	
RFFECT	SYSTEM	SSOI	(9)		
8	INE	THUCKI	(2)		
	EPSONNEI	SZAIT	(4)	le Range Scale ointer vill rem rowided by the ind the onso	
O TO COMPANY	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(6)	Hauge 4. The conscipled on point. Its Fange signals are Farge PCB is located in the stimulus to 11 Loss of input stimulus to 11 Loss of input stimulus to 11 Loss of input console connector 18 (signal) due to signal breakdown in cable M227 or signal confliction in the following circuit board 1110 loss of DC power supply input voitable ages to 1144	and 1820 through con- sole con- nector 34 (DC Power)
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	Console Range Indicator - Refer to nautical miles or less from the tou a resolution of 0.2 nautical mile. via cable W227 to connector 38. The control of 0.2 to connector 18.	
	NO.			ο • 66 (λ-50)	

NOTE:

66 (A-50)

# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

UNIT 1 TABLE (Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

620310 DMG. NO./REV.:

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				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	
HAZARD	30 3	YTLITEABORY DVGHHUCCO	(13)	
	MOTEOTHISAED (LEVEL GRAZAH)		(11)	
PAILURE	3.11 5.1	EATOSTEG BY ROTAREGO	(01)	
	ION	FOZE FOZE	(6)	
	MISSION	SSOT	(8)	
NO.	rem	DAMAGE	(2)	
EPPECT ON:	SYSTEM	SSOI	9	
8	NNET	MOCNI	(2)	
	PERSONNE	SZAIT	3	<b>4</b> <sub>2</sub> 0
517000 4 8 4 11	FUNCTIONAL	FALLURE MODE (HAZARD RELEASE MECHANISM)	(3)	Auxiliary Riscrenics Box and the supplementary Do voltages generated by IMAL  iv) Loss of a complete segment of redundant lamps within IMA indicator passembly, v) Loss of cir- cuit path between IM9 indicator assembly and card cage back-plane IA12.  vi) Loss of generated by indicator gassembly, v) Loss of cir- cuit path between IM9 indicator assembly and card cage back-plane IA12.  vi) Loss of pointer and acale inten- sity caused back-plane IA12.  vi) Loss of pointer and acale inten- sity caused by tailure (short or high resis- tance open) within indi- cator on/off
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd)
	ITEM NO.		(1)	0.9

NOTE: Hazard Law.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Megligible)
Rizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.5 (A-Frequent; B-Dat. condbly Probable; C-Occasional; IP-Runote; E-Extremely Improbable;
F-Improsefible)

67 (A-51)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

UNIT 1

TABLE:

620310 DAG. NO./REV.

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8				
	*SNOT-TAGNAMMODAB *STNAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	This failure mode is detectable by the LSO when large incremental errors develop. Small errors are of little consequence to the LSO because of his viaual contact with the aircraft in the approach. Small errors will ultimately be detected through periodic calibrations and corrected with an appropriate maintenance action. If only the HVD display is affected in this failure mode, the LSO will use the console display.
HAZARD	20	YILIIAASORT DAGRIDOO	(12)	
	NOTECTICATION (LEVEL)		(11)	Ħ
EAILURE	1	EATCTAE BY HOTARAGO	(10)	×
	ION	POTENTIAL LOSS	(6)	•
	MISSION	SSOI	(8)	
ON:	SYSTEM	DYMYCE	(7)	
EPPECT	SYS	SSOI	(9)	
E	NNE	YHUUNI	(2)	] 
	PERSONNEL	SZAIT	€	1
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	switch IAI7SIS and/or Indi- cator indi- cator inten- tiometer IAI7RII.  b) Single un- changing indi- cation, non- linear res- ponse, or premature limiting less than full- scale.  1) Component fallure within pop- ulation of ling board causing geometric non-lin- earity of load laolation amplifiers and/or loss of the analog-to- digital (A/D) con- version
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	
	ITBH	ç	(1)	0.9

flazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Negligible)
flazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
f-Impossible)

68 (A-52)

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

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UNIT 1 TABLE: (Sub-system) HEADS-UP-DISPLAY CONSOLE HAME:

DMG. NO./REV.: / 620310

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				MAEC-31-/326	
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAPRTY CONTROLS)	(13)	·	5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
HAZARD	<b>3</b>	YTLIESEORY DARRICCO	(13)		5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
1	NOTICOTICSAT (JEVEL GRAZAH)		(11)		11: IV-W
PAILURE	371 21	DETECTAE BY OPERATOR	(10)		-Hargina
	MISSION	POTENTIAL POTENTIAL	(6)		E
	MI8	SSOI	(8)		itica
5	SYSTEM	DYMYCE	(1)		Ÿ
EPPECT	11	SSOT	(y)	•	thici
	PERSONNET	XMOCNI	(2)		astro
	PERS(	TIAES	3		2
- Stipoda a sail	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE . MECHANISM)	(3)	1) which drives the 109 Indicator assembly.	para.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont.4) b)	Hazard Level, Column 11, par MIL-STD-882A,
	ITEM	9	3	•	NOTE: H

69 (A-53)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-UND CONSOLE SYSTEM

NAEC-91-7958

(Sub-aystem) UNIT 1

TABLE: NAME:

HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.

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	SWOIL CONDING STRAIGHTON	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS)	(13)	ate of Denont boale is the vertical scale to the right of the PLAT. The oming altogeth ha it approaches the CV on its gild-altop public to its final man of 192 feet per minute of 18 value. A trend lamp adjacent to the main pointer change for trend to the main pointer from the first and the first
HAZARD		TILILEASORY .	(13)	to the tra gild tra gild tra gild mp adjace from of 5 mp adjace from tra general from tra gild from tra
1.		inofficaad Eval Gaarah)	(11)	al scal resolu resolu e trend la rend la rend la rend la rend la rend la
FAILURE	1	DETECTAB BY COERATOR	(10)	aches the CV on a vith a rasolutue. A trend law indicator input feet per minute x III
	MISSION	LOSS POTENTIAL ROSS	(6)	traft he it approaches to a feet per minute with a trace of descent. If a sasing. The ROT indicated to 0.2000 feet per minute with a sasing.
i No	$\vdash$	DYWYCE	(8)	
5	SYSTEM	SSOT	(6) (7)	of Descent aircraft of 1912 fee into to re increasin responding
EFFECT	_		(5)	mum of 195 mum of 195 con inue change airc change airc change airc change chang
	PERSONNET	FIAES	3	The late of Des se and rough a late se and rough on a late but of change on a late the rate is increased.
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Nefer to Figure 5.  a range of zero to t feet per minute, in t feet per minute, in t feet per minute, in t a lover number, t a lover number, t a lover number, t li Lose of input etimulus to 1) Lose of input etimulus to 1) Lose of input etimulus to 1) Lose of input console con- nector 18 (Lignal) due to aignal breakdown in cable W127 or signal Junction Box Unit 4Al, t) to aignal console will init in lose of DC power supply tinput vol-
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Compole Rate-Of-Descent Indicator - indicator displays the Rate Of Desc touch-down point. The scale covers rate of descent is greater than 191 and of lesser intensity is used to of descent is decreasing; and if it ACLS system which provides varying
	ITEM	<u>.</u>	ε	<b>7.0</b>

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frepkent; B-Reasonably Probable; C-Occasional; D-Nemote; E-Extremely Improbable; F-Impressible) MOTE

Vice Carry

70 (A-54)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

The state of the s

NAEC-91-7958

UNIT 1 TABLE

(Sub-ayatem) HEADS-UP-DISPLAY CONSOLE

HAME:

620310

DMG. NO./REV.:

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			,	NAEC-91-7958	_
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	•	astrophic; II-Critical; III-Marginal; IV-Negligible) (A-Frequent; 2-Releasingly Probable; C-Occasional; P-Remote; E-Extremely Improbable;
HAZARD		YNTHABORY EMERNICOO	(11)	·	gligible ional; to
•	ND:	eval (gearer) Eval (gearer)	(11)		1; IV-Ne C-Occus
PAILURB	्रा स्या	DETECTAB BY COPRACTOR	(10)		-Margina robuble;
	NOIS	FOR FOR FOR	(6)		III 1
	MISSIM	SSOT	(8)		1tical
5	SYSTEM	DYMYCE	(2)		9
ינים	1_	SSOT	(9)		hter grent
EFFECT ON:	PBRSOWNED	XXOCNI	(2)		strop A-Fre
i	PBRSC	SZAIT	•		3.2
HAS ADVIOUS	FUNCTIONAL	FAILURE MODE [HAZARD RELEASR MECHANISM)	(3)	iii) (DC power) provided by Auxiliary Riscronics Box and the supplementary DC voltages generated by IAA, IV) Loss of a complete seg- ment of redundant Iroandescent Iroandescent Iroandescent Iroandescent Indicator assembly v) Loss of ctr- oult path between IAA Indicator assembly and card cage back-plane IAI2, vi) Loss of pointer and seared inten- sity caused by failure twhort or high resals- tenore open)	3.4
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont · d)	Hazard Level, Column 11, per MIL-STD-682A, Hazard Probability, Column 12, per MIL-STD
	ITEN		(1)	71 (3-55)	MOTE: 151

71 (A-55)

## (FALLURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

NAEC-91-7958

(Sub-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE:

NAME:

620310 DMG. NO./REV.:

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8					
	SIGULTEUNAMOUS SENAMOUS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION HEASURES, SAFETY CONTROLS)	(13)	A malfunction of this variety is autremely unlikely. If it would occur, the sense of direction for changing data would not be as evident, but identifiable by noting the directional movement of primary pointer lamp.	This failure mode is detectable by the LSO when large incremental errors develop. Small errors are of little consequence to the LSO because of his visual contact with
IIAZARD	 B	YTLIEABORY COUNTENCE	(12)	ea .	84
1	<b>1</b> 20	inditierad Evel Grasah)	(11)	<b>!</b>	111
FAILURE	27: 27:	DETECTAB BY SOLARIOR	(10)	н	×
	MISSION	POTENTIAL SEOJ	(6)	•	ı
	MIS	SSOI	(8)		ſ
8	SYSTEM	DAMAGE	(1)	ı	1
EFFECT		SSOI	(9)		4
N	PERSONNET	YMULKI	(2)	1	(
	PEPS	FIAES	€		1
GIROGE	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	wi) indicator on/off switch indicator intensity or indicator intensity potentio- meter in1789.  b) No trend indi- cation i) Component fallure within the population of the in23 con- ditioning board in the comparator and latch cliculty where period- ically stored A/D data is compared vith current A/D data for the display of the sense of direction for changing data	c) Single unchanging indi- cation, non- linear response, or premature
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd)	
	ITEM	<u>.</u>	(1)	7.0	

Hazard Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improsable) NOTE:

72 (A-56)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O 150-MUD CONSOLE SYSTEM

NAEC-91-7958

HEADS-UP-DISPLAY CONSOLE (Sub-system) NAMB:

UNIT 1

TABLE:

620310 DMG. NO./REV.:

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	ATIONS	SIONS MEASURES; S)		oach. tely be c calibra- a a calibra- a cali	ely improbable;
	COMMENTS, RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	the aircraft in the approach. Small errors will ultimately be detected through periodic calibra- tions and corrected with an appropriate maintenance action. If only the HMD diaplay is affected in this failure mode, the ISO will use the console diaplay.	Pumote; E-Extrem
HAZARD	3 30	TILLIEASORY ENGINEERO	(13)		egligible stonal;
1	(Z	Trofiesad Svei Grash)	(11)		C-Occas
FAILURE		EATDETEC YE ROTARSTO	(01)		l-Margina Probable;
	MISSION	POTENTIAL SECI	(6)		II i'i
	HIS	SSOT	€		ritic.
ON	SYSTEM	DYWYCE	3		11 P
EFFECT		SSOT	9		strophic; II— A-Franent; B F-Impossible)
2	PERSONNEL	MUCHI	(2)		Astro (A-Pr
	PERS(	FIAES	€		3.2
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	limiting less than full-scale.  1) Component failure with- in gogulation of 1M19 aig- nal condi- tioning board causing loss of analog-to- digital (A/D) conversion and/or loss of the de- coder/multi- plexers out- put to the console lamp power drivern	82%, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neshigible)-STD-882A, para. 5.4.3.2 (A-Franch: 8-kascoubly Probable; C-Occasional; D-Franch: 8-kascoubly Probable; C-Occasional; D-Franch: 8-kascouble; C-Occasional; C-Occ
	ITEM DESCRIPTION	COMPONENT, MODE OF OPERATION, PUNCTION)	(2)	(cont.4) a)	Hazard Lovel, Column 11, per MIL-STD-882A Hazard Probability, Column 12, per MIL-ST
	ITEM	<u>.</u>	ε	• .	NOTE:

73 (A-57)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

RAME:

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58				
••	- SNOTT-YONAM - STNAMOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	the vertical scale to the left of the PLAT display. The  SPR-42 rader It indicates ramy motion plus ship's  Is used to delect ship's trim as a separate display on  Sected for display. The scale is a zero center display on  Sected for display. The scale is a zero center display  Solo feet is covered by a red filter to  possible ramy strike, The ramy pointer remains at  only the console display of ramp motion/trim information, the LSO  will use the HUD display. When  a failure occurs that display  a failure occurs that display  both displays, the LSO will depend  on the hook to ramy alarm in an auxilitary instrument facility  (base console) in the LSO woll depend  on the hook to ramy clearance  ted for a ramp condition causing  a 7 to 3 ft. hook to ramp clearance  and an audible alarm sounds when  the clearance is less than 3 ft.  This failure mode would, therefore,  not significantly affect safety  during a given recovery period  and it would be corrected before  the next one.
HAZARD	30	TILLIEASORY CONSIDERACIO	(13)	the left of the left of the left of the scale of the scale of the scale of the left of the
١,	NOTIFICATION (JEVSI ORASA		(11)	scale to elect sh splay. 20 feet strike, III
FAILURE	27 27	EATDETEC YE ROTAREGO	(10)	Scale is the vertical scale to stead of the SPN-42 radar. It is the being a sect of for display.  a between -10 feet and -20 feet a possible ram strike,  x - x III
	MISSION	POTENTIAL SEOJ	(6)	the 1st
	MIS	SSOI	(8)	of the last of the
S S	SYSTEM	DAMAGE	(7)	
EFFECT	L_	SSOT	(9)	The Ramp Motio squiter (SFIC) in savitch on the hen silp's trim w ramy. The are rea and wans the feet extremes.  X - x
E E	PERSONNET	XXUCNI	(2)	
	PEPS	FIAES	3	The moute of the part of the p
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Nefer to Figure 6. The by a liamonization Corpute 6 has menetary taggle switch has acale comes on when any to -19 feet of 10 ramphis is the danger area as adds the +20 or -19 feet as a season of input atlands to algorithm to algorithm to algorithm to algorithm breakdown in cable W227 or Signal breakdown in cable W227 or Signal breakdown in cable W227 or Signal confiditioning a ramp motive signal conditioning circuit board alithous of DC power supply input woldithous and 11420 output, and 11420
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console Ramp Motion/Trim Indicator - Re input information source is the ship's input information source is the ship's trim in the mornal operating mode. A sthe Ramp Scale. A Trim lamp below the with a range of +20 feet of high ramp produce a red pointer indication. This full scale when the ramp motion exceeds the scale when the scale
	ITEM	Š.	Ξ	o.

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improssible) MOTE:

74 (A-58)

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

IAEC-91-7953

TABLE: UNIT 1

(Sub-aystem) HEADS-UP-DISPLAY CONSOLE

NAME:

DMG. NO./REV.: 620310

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_	<del></del>					NAEC-9.	<b>5</b> -730
	COMPUTE: DECOMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)				•
HAZARD	مَد	YTT TEAGORY	(13)				
١.	VE)	encete and enceted	(11)				
FAILURE	ر عرا	EATTECTAB BY ROTAREGO	(01)	·			
	MISSION	POTENTIAL SECJ	(6)				
	MIS	SSOI	(0)				
3	SYSTEM	SPAMAG	(1)				
BPPEXT ON:	878	SSOI	(9)			·	
M	PERSONNET	YAUCHI	(2)				
	PERSC	FIAES	3				
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELRASE MECHANISM)	(3)	111) connector 14 (DC power) provided by Auxiliary Rictronics Box and the supplementary DC voltages generated by	iv) Loss of a complete segment of redundant incandescent lamps within indicator assembly,	v) Loss of cir- cuit path between 1A10 indicator assembly and card cage back-plane	vi) Loss of pointer and scale inten- sity caused by failure (short or
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) a)			
	ITEM	ğ	(1)	o.			

Mazard Lav.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fruquent; B-Reasonably Probable; C-Occasional; D-Rancte; E-Extremely Improbable;
R-Improbable;

NOTE

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75 (A-59)

#### (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

MAEC-91-7958\_

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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TITY TO THE PARTY OF THE PARTY					13	EFFECT ON:	NO S			FAILURE	1	HAZARD	
MO. OPERATOR, FUNCTIONS  (1) (2) (1) (3) (4) (5) (6) (7) (9) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	ITEM	ITEM DESCRIPTION		PERSO	MINET	SYST	$\vdash$	MISSI	<del> </del>	271	(7)		COMMENTS: RECOMMENDATIONS:
(1)	9	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	TIAES	YAUCNI	SSOT	DAMAGE			DETECTAB BY OPERATOR	TVOTTICZĄD ZVZI OWAZAH)		COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)
8.0 (cont'd) a) vilin mind and adiation open) within indicator or annotation or annotation or annotation or annotation or annotation or premature or	3	(2)	(3)	3	$\vdash$	-				(10)	(11)	(12)	(13)
					<del></del>	*				×	H ·		A malfunction of this variety is extremely unlikely. If it would occur, the LEO would depend on the auxiliary provisions described in item (a) above.

Hazard Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

76 (A-60)

# (FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./RBV.: 620310

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		_	NAEC-71-/936	_	
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	•	
HAZARD	ж Э	THORNELTY TOWNSHIPSON	(13)	•	
1.	(T)	INOTTICZĄD Svzi Granch)	(11)	•	
FAILURE	eri Eri	EATCETEC YE KOTAKETO	(01)		1
	MISSION	POTENTIAL EOSS	(6)		1
	MIS	SSOT	(8)		
EFFECT ON:	SYSTEM	DAMAGE	(1)		
PPECT		SSOT	(9)	• •	Ţ
M	PERSONNET	YRUCHI	(5)		]
	PERS	FIAES	€		
- SIDOUGE SAN	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	i) and/or loss of the analog-to-digital (A/D) conversion which drives the lalo didicator assembly.	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) b)	*····
	ITEM	ž	(1)	•	

Hazard fewel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic) II-Critical; III-Marginal: IV-Marhigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.4 (A-Frequent: Indicated Probability, Column 12, per MIL-STD-882A, para. 5.4.3.4 (A-Frequent: Indicated Probability, Column 12, per MIL-STD-882A, para. 5.4.3.4 (A-Frequent: Indicated Probability, Column 12, per MIL-STD-882A, para. 5.4.3.4 (A-Frequent: III-Marginal) III-Marginal III-Marginal IIII-Marginal III-Marginal II-Marginal III-Marginal II-Marginal III-Marginal III-Marginal II-Marginal II-Marg

NOTE:

77 (A-61)

#### (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-1110D CONSOLE SYSTEM MAEC-91-7958

UNIT 1 TABLE: (Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

DWG. NO./REV.:

620310

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58	·						
		COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	the PIAT, indicates sirreft airspeed by a moving  vill stay at 80 knots when the correct value is  junctional or greater than 180. The scale incorporates  increasing or decreasing airspeed. When the airspeed  rend lamp is one knot greater. Either true airspeed  is made by the TAS/CISG toggle switch located near the  litter TS or CISC; speedring at the right-hand end  NH-4 kedar can be selected as the source of the  scent to the TAS/CISG switch. The choice thus made is  been to the TAS/CISG switch. The choice thus made is  ren  - x III D A malfunction of this variety is  remote. However, if it should  occur, the LSO will depend on  visual contact with the aircraft or its angle of attack lights,  the sound of the aircraft's  engines (power state) to judge  approach speed.		
HAZABO	TOBABULUTY OF TOTAL STREET		(12)	alrcraft a when t n 180. graafre graafre toggle gwitch. o-to-ana D			
	İ	(T)	TROTTISAD EVEL GRASAH)	(11)	cated above the PIAT, indicates pircraft its pointer will stay at 80 knots when twill stay at 80 knots when twill be or greater than 180.  Ate either increasing or decreasing airs preed, the trend lamp is one knot greater oldection is made by the TAS/CISG toggle shown by the letters TAS or CLS; appear or or its SNA4 radar can be selected as switch adjacent to the TAS/CISG switch.  If the number, 41 or the number, 44.  4 is a synthro dutput. A synchto-to-and x III D		
SATIABE		271	EATCETAD BY TOTAREGO	(10)	the PlAT, is vill stay at ual to or greend alone or greend and so wad by the he letters TA or the rro dutput.		
		ION	POTENTIAL LOSS	(6)	intervilla is equal ther incre in is made by the le is SN-44 adjocent sumber, 4 synthro		
		MISSION	SSOI	(8)	abovointe the the the the the the the ship is a ship in the the ship in the the the the the the the the the the		
į		SYSTEM	DAMAGE	(7)	cated abovitts pointe walue is e atte either peed, the colection is shown by r or its S switch adj f the numb is a syn a		
	•		SSOI	(9)			
	•	NNE	YAULNI	(5)	poin s).  poin s).  poin s).  poin s).  Act togs  The SPN		
		PERSONNED	LIVES	(4)	respend scale, 1c n 100 points). ver the correct pointer to indi- dectorasing alrest entation. The i fice thus mide is SPN-42 ACLS rada r SPN-44 teggle y the presence tage. The SPN- as the SPN-12.		
	HAZARDOUS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	180 knots (0 to 180 knots (0 to 180 knots when the seas and with the seas and will repeat the ship's panel. The chair she same range to a indication to a signal breakdown in cable Will cos of circultry paths between 1822 (synchro) Junction Box Unit 4A2, (1) Loss of circultry paths between 1822 (synchro) Junction Box Unit 4A2, (1) Loss of circultry paths between 1822 (synchro-to-analog converter ckt. board), 1A23 (airspeed signal converter ckt.		
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console Airspeed Indicator - Refer to Figure 7. The alpointer light over a range of from 80 to 180 knots where a trend last to 80, and will read 180 knots where a trend light of lesser intensity alfacent to the main (TAS) or closing airspeed (CLSG) may be chosen for pres middle and at the bottom of the control panel. The choof of the Airspeed scale. In addition, either the ship's alrespeed scale. In addition, either the ship's alrespeed scale in addition, either the ship's alrespeed scale in addition, either the ship's alrespeed scale indicated at the right-hand end of the Airspeed scale indicated at the right-hand end of the Airspeed scale indicated at the supplementary of the Airspeed scale indicated at the scale in the same range convert its output to analog voltage of the same range from console convert its output to analog voltage of Synchro) due from console console scale indication in the Airspeed scale in the scale in t		
		LTEN	NO.	ε	79 (3-62)		

MOTE: Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probable; C-Occasional; IP-Remote; E-Extremely Improbable;
R-Improbable;

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78 (A-62)

CFAILUME MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

... PERFECT HEADS-UP-DISPLAY CONSOLE

620310

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				NAEC-91-7958	
	SNOTTENDE SCHWENOS	COMPENSATING PROVISIOUS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	-	
HAZARD	<b>3</b> 0	YTLITEAEORY TOTANICOCO	(13)		•
٠	(1)	TYOTTISZAD SVZI GYAZAH)	(11)		
PAILURE	1	DETECTAE BY OPERATOR	(01)		_
	NOI	POTENTIAL ROSS	(6)		
	MISSION	ssor	<b>®</b>		_
ON:	PEM	DAMAGE	(3)		
EFFECT ON	SYSTEM	SSOI	9		_
83	NNET	MUCNI	(2)		_
	PERSONNEL	TIAES	ê		_
GANCAGABAN		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	11) ditioning ckt board), and 182 (console alrapeed indicator) interconnec- ted via card cage back- plane 1812, till loss of pointer and scale inten- sity caused by failure (short or high resis- tance open) within indi- cator on/off switch intensity power supply intensity power supply intensity power supply intensity power supply intensity power supply intensity power supply intensity power supply intensity power supply intensity power supply intensity intensity power supply intensity power supply intensity power supply intensity intensity intensity intensity con- tages to intensity intens	
(*************************************		GERATION, PURICEION)	(2)		
	! ,		=	•	

MONE: Hozard Lov.1, Column 11, per MIL-STD-882A, para. 5.4.3.7 (I-Catastrophic; II-Critical; III-Marghad: 7V-Neulicity) Column 12, per MIL-STD-882A, para. 5.4.3.7 (A-Prequent: 8-Moneyable; C-Cocasional; P-Parote; E-Extremely Improbable; P-Impossible; P-I

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Page

# (FAILURE MODES & FFEECTS AMALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

NAEC-91-7958

8	_		-	
•	- SNOTTENDAMMODAL STRAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	•
HAZARD	عد	TTLIIEAEOFF	(13)	
,	(7)	INOTTICZĄJO ZVZI GRANII)	(11)	
FAILURE	37	EATCETEG BY ROTAREGO	(10)	
	SION	POTENTIAL SEOJ	(6)	
	MISSION	SSOI	(8)	
3	SYSTEM	DYWYCE	(7)	
EFFECT ON:	SYS	SSOT	(9)	
蓝	PERSONNEL	XXOLNI	(2)	
	PERS	FIAES	€	λ.
	FUNCTIONAL	FALLURE MODE (HAZARD RELEASE MECHANISM)	(3)	Auxiliary Electronics Box and the supplementary DC voltages generated by IA4,  v) Loss of a complete segment of redundant lamps within IA2 indicator assembly,  vi) Loss of air- apeed select (TAS/CLSG) or radar select (TAS/CLSG) or radar select (SPN 42/4) Indication due to fail- ure of redundant indication due to fail- ure of redundant indicator lamps resi- dent on air- speed indi- cator lamp board (Dwg. 5:)633) por- tion of 1A2 indicator lamps resi- dent on air- speed indi- cator lamp board (Dwg. 5:)633) por-
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	(cont'd)
	ITEM	Ć	(1)	o 6
				80 (A-64)

Mazard Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Neuligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasorubly Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) MORE

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE:

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DMG. NO./RBV.1 620310

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				,	NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)			A malfunction of this variety is actemely unlikely. If it would cocur, the sense of direction for changing data would not be as evident, but identifiable by noting the directional movament of the main pointer lamp.	A malfunction of this variety is autremely unlikely and detectable by the LSO under periodic calibrations which will lead to an appropriate maintenance action. According the problem, the LSO will depend more fully on the alternate described in item 9(a) above.
HAZARD	3O	YTT. IT. EARDRY.	(13)	44	940
•	E 2	Trothesad Evel (Frame)	(11)	11	11
PAILURE	21 371	EATCETAG YE ROTARETO	(10)	×	н
	MISSION	POTENTIAL LOSS	(6)	1	1
	MIS	SSOI	(8)	ı	1
S.	SYSTEM	DAMAGE	(7)	·	1
EPPECT ON:		SSOI	(9)		•
20	PERSONNEL	MOCNI	(2)		1
	)SA SI	FIAES	(+)	1	•
Stocker	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	b) No trend indication  1) Component failure within the population of the 1A23 signal conditioning board in the comparator and latch circuitry where periodically stored A/D output data is compared with current A/D data for the display of sense of direction for changing data	c) Single un- changing indi- cation, non- linear response or premature limiting less then full scale.  1) Component full scale. in popula- tion of
	ITEN DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(cont'd)	
	ITEM NO.			o.	

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; Fy-Nashigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prognent; E-Researchly Probable; C-Catastonal; P-Research E-Extremely Improbable;
P-Impressible; MOTE

81 (A-65)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-IUD CONSOLE SYSTEM

UAEC-91-7958

TABLE: CNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			The ability to alternate between TAS and CLSG is supplemental to the LSO.
HAZARD		YTLIISASORG	(12)	pć
1.	(7)	TIVOTTICZALD SVSI ORASAH)	(11)	21
FAILURE	ETE ETE	EATCETAG BE KOTAREGO	(10)	<b>x</b>
	MISSION	POTENTIAL S201	(6)	· ·
	MIS	TOSS	(8)	ı
NO.	SYSTEM	DYMYCE	(7)	•
BFFECT	l '	SSOI	(9)	1
	PERSONNEL	XXULNI	(2)	
	PERS	FIAES	(4)	•
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	1) MA23 signal conditioning board causing geometric non-linearity of load iso-lation amplifiers and/or loss of the analog-to-digital (A/D) conversion which drives the 1A2 indicator assembly.  d) Non-select of true airspeed (TAS) or closing airspeed (TAS) or closing airspeed (CLSG).  1) Imoperative control switch limits of internal short, high resistance open, or mechanical fatigue of toggle stem.
	ITEN ITEN DESCRIPTION (COMPONENT, MODE OF NO. OPERATION, FUNCTION)			(cont.d)
				·

Mazard Loval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable;
F-Improbable; NOTE

# (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

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NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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				NAEC-91-7958
	COMMENTS: BECOMMENDATIONS:	CONPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	Inability to select a functional radar system, if the alternate faults, would not preclude the measurement of actual TAS/CLSG.
HAZARD		YTT. DEMONS.	(12)	22
1	E 20	irottisald Eval Grash)	(11)	2.
FAILURE	ट्या इस	EATSCTAE YE YOTAREGO	(01)	N
	SION	POTENTIAL POTENTIAL	(6)	. 1
	MISSION	SSOI	(8)	
NO No	SYSTEM	DAMAGE	(1)	l .
EPPECT ON	1 1	SSOT	(9)	1
<b>S</b>	PERSONNEL	MUCHI	(2)	1
	PERC	SZAIT	(4)	1
OH CARREST	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	e) Non-select of radar systems (SPN 42/44)  i) Inoperative control switch lai7510 due to internal short, high resistance open, or mechanical fatigue of toggle stem.
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(coat ' d)	
	ITEM	ò	3	o.

NOTE: Mazard Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Marylna); IV-Marijujble)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: 9-Mais y Probable; C-Obcusional; IN-Marote; E-Extremoly Improbable;
F-Impressible)

83 (A-67)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM), SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAMB:

DWG. NO./REV.: 620310

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	:	SHOTT ACMANDO 3 STREAM	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	tors are located on the left of jacent red light indicates a ven a wwe-off. The LSO rave-off is indicated by the red rave-off is indicated by the red condition of the deck. Without accurate information, the LSO can err by allowing an incoming aircraft to land on an obstructed flight deck. The clear deck/foul deck indicator are repeaters of a deck status system display located aft of the LSO platform. If there is no indication on the display console, the LSO will depend on the aft display.
	IIAZARD	20	YILLIEABORT CMORICCO	(12)	
	ŧ		TIKOTTIEZAJO EVEJ ORASAH)	(11)	us indic ant an a ft An a An a minute.
	FAILURE	ET.	EATCETEC BY ROTAREGO	(10)	land aircraft.  land aircraft.  lickle saitch.  flashes per min
	_	MISSION	FOLENTIAL SOLENIAL	(9)	ree chian ch
1		MIS	SSOI	(8)	1
	. ON:	SYSTEM	DAMAGE	(1)	Ture of formation of the formation of th
	RFFECT	L	SSOI	(9)	appro
	藍	PEPEONNEI	YHUUNI	(2)	- Jefer Color of District of Pictor
		PRPS(	FIAES	€	101 101 101 101 101 101 101 101 101 101
	Disordana	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Status Indicate cates the deck affect must be deck lamps.  Mo indication deck lamps.  Mo indication deck status.  I) Loss of deck status input stimulus to status input stimulus to indicate of cates of
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console Deck Status and FLOAS Wave-off the Airspeed Scale. A green light indi closed (foulsed) dock and any approach in initiates a Freshel Lens Optical Laidin flashing lamps below the open and close a) a)
	NO.			ε	P. 0

MOTE: Hazard Lav.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improbable;

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-BUD CONSOLE SYSTEM

NAEC-91-7958

TABLE, UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

NAME:

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_					NAEC-91-7958
	COMMENDS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)		This indicator is the only display indicator, by which the Liso can verify that his "pickle switch" has initiated the Frescel Lens Optical Landing System (FLOK) wave-off to signal the pilot on the glide-slope landing approach not to land. FLOKS Wave-off Monitor Assembly, located aft of the LSO platform, offers a redundant indication that wave-off has been initiated.
HAZARD	æ	YILLIEABORG Digibbildoo	(113)		٩
1	(1)	mortiezad Svai Grassi)	(11)		H
PAILURE	डा इ	DETECTAB BY OPERATOR	(01)		я
	MISSION	POTENTIAL SECJ	(6)		ı
	MIS	SSOT	(8)		ı
NO	SYSTEM	DAMAGE	(3)		1
EFFECT ON	l	SSOT	(9)		ı
M	PERSONNET	XXCCNI	(5)		1
	PBRS	SZAIT	€		1
o i o da a a a i	FUNCTIONAL	FAILURB MODE (HATARD RELEASE MECHANISM)	(3)	11) breakdown in assembly, 111) Loss of DC input voltage (+12v) to 113 from 114, 1v) Loss of indicator cation due to failure of redundant indicator lamps resident in the deck status lamp assembly (11312), v) Wiper 11ft-off in intensity control potentio-seter 181785	b) No indication of 150 wave-off.  1) Lose of wave-off signal input to 15,000 km and console concorrector 12 (A/C Designal breakdown in breakdown in
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(coat'd)	
	ITEM	ğ	ε	10.0	

MOTE: Nazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Proquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-THEXESSIDES

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85 (A-69)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-MUD CONSOLE SYSTEM

MAEC-91-7958

UNIT 1 TABLE

(Sub-system) HEADS-UP-DISPLAY CONSOLE MAME

620310 DMG. NO./REV.

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		-	RES,		
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			(61)	-
	HACARD	<b>3</b> 0	YTLIDA/BORY	(12)	
	١	(Z	CLASSIFTCATO EVEL GEASARIO	(11)	
	FAILURE	21 27(	DETECTAL  OPERATOR	(10)	
		ION	POTENTIAL	(6)	
	-	MISSIM	SSOI	(8)	
	5	SYSTEM	DYMYCE	(1)	
	KFFECT ON	SYS	SSOI	(9)	
		NNE	XXOCKI	(2)	
		ERSONNE	LIVES	€	
	HATARDOUS- FUNCTIONAL FAILURE HODE (HATARD RELEASE MECHANISM)			(3)	i) cable W221 and/or Signal Junction Box (Unit 4A1), ii) Loss of IA1A (dwg. S18599) deck status/ isto wave-off circuit ass- embly lamp drive cause by component breakdown in assembly, iii) Loss of DC input vol- tage (+12v) to IA3 from IA4, iv) Loss of indi- cation due to failure of redundant indicator lamps resi- dent in the deck status lamp assembly (1A3A2)
		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(cont'd) b)
		HATI	•	ε	96 (A-70)

86 (A-70)

NOTE: Hazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Immarille)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 150-HUD CONSOLE SYSTEM

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UNIT 1 TABLE: (Sub-system) HRADS-UP-DISPLAY CONSOLE NAME:

620310 DWG. NO./REV.

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			-		NAEC-91-7958
	SNOTE CONSUMO 25 STUBBLE	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(E1)	tarboard (S), and the magnitude of the The angle is relative to the centerline wind dow) the centerline of the ship would o used for these alpha-numeric characters. direction. Normal landing operations  III D Wind direction across the carrier deck is important and critical for the recovery of aircraft. Once the malfunction is evident to the LSO, he will alert Primary Flight who will communicate wind direction information taken from a PRI-FLY indicator.	•
HAZARD		TILLEASORS EDVERSIOON	(13)	tarboard (S), and The angle is rail wind down the cent o used for these direction. Norm	
,	ND (T	ITACITICAAN TVAL GAASAH)	(11)	tarboard (5) The angle wind down th o used for th direction.	
FAILURE	E E	EATSETEC YE ROTARIEO	(01)	(F) or displays.  i are also  k arboard  x	
	MISSION	POTENTIAL ROSS	6)	port tus ator or	
	HIS	SSOT	9	tther the transfer of the transfer of the transfer of	
8	SYSTEM	DYMYCE	3	he a	
EPPECT ON	SYS	SSOI	(9)	nd direction, either re alove the ACLS St. he alip's centerline t, incandescent indi re in either the por h-doon-point.	
<u> </u>	BREONNEL	MOCNI	(5)		·
	PERE	PIASS	€	The version of the ve	
	HAZARDOUS- FUNCTIONAL	FAILUR MODE (HAIARD RELEASE MECHANISM)	(3)	lo.5 degrees to poxime 9.  10.5 degrees to poximo.5 degrees to the centerlin synchro information from connector 17 (Synchro) due to signal breakdown in cable with the synchro junction Boximo.5 degrees to signal breakdown in cable with the signal breakdown in cable with the signal breakdown in cable with the signal breakdown in cable with the signal breakdown in cable with the signal breakdown in cable with the signal breakdown in cable with the signal with t	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	Console Wind Direction Indicator - befor to Figure 9. The viangle in degrees a indicated by three alpha-numeric charact of the angled landing deck which is 10.5 degrees to poxt of be indicated on the Console as an \$10.5° wind. Saven-segment Approximately 50° can be displayed by the wind angle indicated are conducted with the wind within 10° of the centerlies town are conducted with the wind within 10° of the centerlies town are conducted with the wind within 10° of the centerlies town formation in formation from console connector 17° (Synchro) due from the cable William in cable William 10° (Synchro Junctiful Box (Unit 4A2),	
	ITEN	9	(1)	• • • • • • • • • • • • • • • • • • • •	

NOTE: Mazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prespient: 9-Research) Probable; C-Occasional; D-Romoto; E-Extremely Improbable;
F-Impressible;

87 (A-71)

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958 (Sub-system) HEADS-UP-DISPLAY CONSOLE 620310 DMG. NO./REV. 1 UNIT 1 TABLE NAME:

•	-	-	- <u>**</u>		
		COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	
HASABA		30 30	YILLIEAEORY Disabilecco	(13)	·
1	1.		MADITIZALD EVELI GRASAH)	(11)	·
PATTION	3	رج 111	DETECTAE BY OPERATOR	(10)	
		NOI	FOLENTIAL POTENTIAL	(6)	
		MISSION	SSOT	<b>(B</b> )	
į		SYSTEM	DAMAGE	(7)	
Present Oll		SYS	SSOI	(9)	
		PERSONNET	<b>YAUTNI</b>	(2)	
		PERS	FIAES	3	
	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE HECHANISH)			(3)	iii) Loss of DC power supply input voltages to 1M4,1M6A2, and 1M21 through con- sole con- nector 3/4 (DC power) provided by Auxiliary Electronics Box and the supplementary DC voltages generated by 1M4, Iv) Loss of Light-Emit- ting-Diode (LED) seg- ments of 7- segment indicators in assembly 1M6M5, v) Component failure within the population of the 1A21 synchro-to- analog Cat, board, 1M6A2 wind velocfy, wind velocfy,
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			OPERATION, FUNCTION)	(2)	(cont'd)
	11 %			3	11.0
					88 (2=72)

NOTE: Mazard Level, Column 11, per MIL-STD-862A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-862A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible)

88 (A-72)

NAEC-91-7958

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

UNIT 1

TABLE

DMG. NO./REV.; 620310

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	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	ı	A malfunction of this variety is autremely unlikely. If it would occur, the ESO would notify Primary Plight of his problem; and they would communicate information to the ESO. PRI-PLY monitors wind-over-deck on a routine basis and would ascertain an unasfe condition that went undetected by the ESO.
HAZARD		YTLIDAADKY EDMONECCO	(13)		QE .
		inaditieza.d Zvzi orazah)	(11)		H
PAILURE	371	DETECTAL BY OPERATOR	(01)		×
	NO.	FOLENTIAL	(6)		•
	MISSION	SSOI	(8)		,
₹	TEM	DAMAGE	(7)		· · · · · · · · · · · · · · · · · · ·
EFFECT	SYSTEM	SSOT	(9)		ı
និ	NNET	MOCHI	(2)		1
	PERSONNET	SZAIT	3		•
- SINOVIGE OF THE	ITEM DESCRIPTION (COMPONENT, MODE OF FAILURE MODE OPERATION, FUNCTION) (HAZARD RELEASE MECHANISM)		(3)	ckt. board, or 1865 - the 3-digit wind direction indicator assambly, vi) Loss of intensity cause by wiper troi potentioners in intensity control potentioners in intensity control switch in intensity control switch in intensity control switch in intensity control switch in intensity control switch in intensity control switch in in in in in in in in in in in in in	b) Single unchanding indication, non-linear response, or premature limiting leas than full-scale.  1) Component fallure with in populations of 1A21 and 1A6A2 causing the synchro-
			(2)	(cont'd) a)	
	ITEM	ġ	ε	n.e	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic) III-Marchal; IV-Mayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: B-Hauschably Probable; C-Occasional; D-Harote; E-Extremaly Improbable;
F-Improstible)

89 (A-73)

SFAILURE MODES & FEECUS ANALYSIS - SYSIEM) SAFETY ANALYSIS MKI MOD O LSO-INUD CONSOLE SYSIEM

MAE	~-y	1-795	_			-	
		Page 45 of 113		- SNOTHENDRANDO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	=
쮦			HAZARD		PROBABILLIY COCUMBENCY	(12)	
NAEC-91-7958				NC NC	ITADITIEZAD ZVZI GRASAH)	(11)	
MAEC			FAILURE	3.1 3.1	EATDETEC YE ROTAREGO	(10)	
				MISSION	FORE BOLENTIVE	(6)	
				MIS	SSOI	(8)	
			Š	SYSTEM	DAMAGE	(1)	
			BFFECT	<u></u>	SSOI	(9)	
	•			PERSONNET	YAUCNI	(2)	
				PEPS	FIAES	(4)	
	SPLAY CONSOLE	-		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	i) to-analog output to akev the 10.5 to port of the center line of the carrier reference compensation (aynchro rotation) for the angled landing deck and/or magnitar non-linearity in the wind angle magnitude display, (11) Component failure within population of 14665 causing seven segment inducator decode BCD input information or failure to uniatch from pre-vious state,
TABLE: UNIT 1	NAME: (Sub-system) HEADS-UP-DISP	DMG. NO./REV.: 620310		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont ' d) b)
· <b>F</b>	Z	•		ITEM	Š	ε	11.0
							90 (A-74)

NOTE: Hazard Low-1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Nemote; E-Extremely Improbable;
F-Inprosaible)

... Will have

90 (A-74)

# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

The state of the s

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

NAEC-91-7958

of 113

Page 46

				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAPETY CONTROLS)	(13)	
HAZARD	3 30	PROBABILLITY  COUNTRY	(13)	·
	(T	Trottosad Evsi Grasah)	(11)	
FAILURE	्र द्वार	DETECTAB BY OPERATOR	(10)	
	ION	POTENTIAL LOSS	(6)	
	MISSION	SSOT	(8)	
S.	SYSTEM	DAMAGE	(2)	
EFFECT ON:	SYS	SSOT	(9)	
2	NNE	MUCNI	(5)	
	PERSONNEL	FIAES	3	
- SINGAL & KH	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	tat lamp switch lamp switch lamp switch lamp switch lamin causing all seven seg- ment indi- cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- ment it il cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- cator ele- ment it il cator ele- ment
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) b)
	ITEM		(1)	11.0

MOTE: Hazard Level, Column 11, per MIL-87D-892A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal: IV-Neyligible)
Hazard Probability, Column 12, per MIL-87D-882A, para. 5.4.3.2 (A-Frequent: 8-Passonal) Probable; C-Occasional; O-Remote; E-Extremely Improbable;
F-Improssible)

91 (A-75)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-100D CONSOLE SYSTEM

NAEC-91-7958

(Sub-eystem) HEADS-UP-DISPLAY CCNSOLE UNIT 1

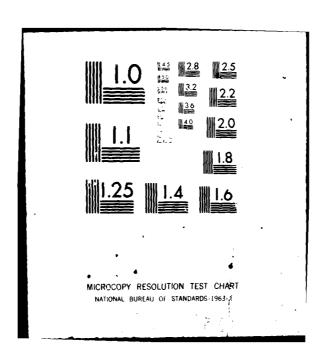
NAME:

620310 DMG. NO./REV.1

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	COMMENTS; RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	ators display the wind speed. These. Normal operations are 30 knots of	Wind speed across the carrier deck is important and critical	for the recovery of aircraft. Once the malfunction is evident	to the LSO, he will alert Primary Flight who will communicate	information to the LSO.					,								•	,		
HAZARD		YTT. TIE AEOFT SYEDWIDSO	(11)		۵								-						-					
1   0	DI	POTTICZAD VZI GWZAH)	(11)	vind argle indi d angle display	111				_								_							
FAILURE	18 83	DETECTA E YE OPERATO	(10)	ow the wind an	×							_							_					
MISSION		POTENTIAL LOSS	(6)	ov the	ſ																			
MIS		SSOI	(8)	9 5e l 8 fn	1																			
ECT ON:		DAMAGE	(1)	racter type a																				
<u> </u>	_1	SSOI	(4)	char ame t	ı																			
FI		INDONI	(2)	mer 1 the	,																			]
2000	2	FIAES	Ξ	two na are	ı												_							
HAZARDOUS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	to Figure 9. The claracter the recovery deck.	a) No indication	1) Loss of input synchro in-	formation	connector 37	to signal	cable W226	and/or Synchro June	tion Box	(Onic 462),	ii) Loss of in-	sole cir-	cultry parns between J7,	1A21 (synchro	board), and	1A6A2 inter-	card cage	back-plane 1A12,	1111 Loss of DC	power supply	TOA Spring
ITEM DESCRIPTION	(COMPONENT, MODE OF	OPERATION, FUNCTION)	(2)	Console Wind Speed Indicator - Refeare capable of 0 to 99 knots indicating wind speed at the proper angle down																				
ITEM			3	12.0																				

KETRON INC WAYNE PA HAZARDS/FAILURE MODES AND EFFECTS ANALYSIS MK 1 MOD 0 LSO-HUD C--ETC(U) MAR 80 F SEVIK, 8 S FARBER, W S MANN N68335-78-C-2002 KTM-1327-01 NAEC-91-7958 AD-A083 720 UNCLASSIFIED 2 oF 3 AD A09 578 (



# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

(Sub-aystem) HEADS-UP-DISPLAY CONSOLE

NAME:

DMG. NO./REV.: 620310

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MAZC-91-					
•	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)				
HAZARD		TILITAGORT SENERATION	(12)		
		TVOTTESALD SVSI (SPASAB)	(11)		
FAILURE	3.1 S.	EATDETECTAE SY OPERATOR	(10)		
	MISSION	Potential Potential	(6)		
	MIS	SSOT	(8)		
8	SYSTEM	DAMAGE	(7)		
RPPECT	BYB	SSOT	(9)		
□	PEREGNNET	XXOCNI	(2)		
	PERE	TIAES	(1)		
HARABOOME	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	and 18642, and 18642, and 18642, and 18642, and 1864 by flow power) provided by Auxiliary Electronics Box and the supplementary Drovided by Drovided by IA4,  iv) Loss of Light- Enitting- Diode (LED) segments of seaven segment indicators in assembly 1865, v) Component failure with- in the pop- ulation of the pop- ulation of the hop- analog ckt. board, 18642 wind welo- cuty/wind direction okt. board,	
	ITEM DESCRIPTION	OPERATION, PUNCTION)	(2)	(cont'd)	
	ITEM	ġ	(E)	12.0	

NOTE: Mazard Level, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical: III-Marginal: IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Prequent: B-wasonably Probable; C-Occasional; D-Monote; E-Extremely Improbable;
F-Impressible)

93 (A-77)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

The second secon

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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958	3				·	
		COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)		A malfunction of this variety is extremely unlikely. If it would occur, the LEO would notify Primary Flight of his problem; they would communicate information to the LEO. Any unsafe condition would be ascertainable by PRI-FLY in their monitoring of wind-overdeck conditions.
	HAZARD	30	PROBABILITY COCUMPENCIO	(12)		£
	1	20	TASTI ORASAH) SVELI ORASAH)	(11)		Ħ
	FAILURE	37 37	DETECTAB BY OPERATOR	(10)		н
		ION	POTENTIAL POTENTIAL	(6)		1
		MISSION	SSOI	(8)		1
	Š	TEM	DAMAGE	(1)		1
	EFFECT ON:	SYSTEM	SSOI	(2)		1
	2	NNEI	INDOM	(2)		t
		PERCONNE	LIVES	(4)		•
		FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	v) or 1A6A6 - the 2-digit wind apeed indicator assembly, vi) Loss of in- tensity cau- soud by wiper lift-off in intensity control potentiometer liAl7N6 or trol switch liAl786, vii) Loss of DC linput vol- tage (+5) to 1A6A2 from IM	b) Single un- changing indi- cation, non- linear response or premature limiting less than full-scale i) Component failure within the populations of 1821 and
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd)	
		ITEM	Š.	ε	12.0	

NOTE: Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

94 (A-78)

# (FALLURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

[]

NAEC-91-7958

UNIT 1 TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

DMG. NO./REV.: 620310

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(COMPONENT: WORD OF PAILING MONE)  (COMPLOSED: WORD OF PAILING MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MONE)  (COMPONENT: WORD WORD MO			HAZARDOUS-		Sã	EFFECT	ਲ ਲ		7	FAILURE	.	HAZARD	
(cont.4) PAILURE MODE  (cont.4) (1) MAGE CAMAIN  (cont.4) (2) (3) (4) 13 MAGE CAMAIN  (cont.4) (2) (3) (4) 14 MAGE CAMAIN  (cont.4) (4) 14 MAGE CAMAIN  (cont.4) (5) (7) 14 MAGE CAMAIN  (cont.4) (6) (7) 15 MAGAGE CAMAIN  (cont.4) (7) 14 MAGE CAMAIN  (cont.4) (7) 14 MAGE CAMAIN  (cont.4) (7) 15 MAGAGE CAMAIN  (cont.4) (7) 17 MAGAGE CAMAIN  (cont.4) (7) 17 MAGAGE CAMAIN  (cont.4) (7) 17 MAGAGE CAMAIN  (cont.4) (7) 17 MAGAGE CAMAIN  (cont.4) (7) (7) (7) 17 MAGAGE  (cont.6) (7) (7) (7) (7) MAGAGE  (cont.6) (7) (7) (7) (7) (7) MAGAGE  (cont.6) (7) (7) (7) (7) (7) MAGAGE  (cont.6) (7) MAGAGE  (cont	ITEM	ITEN DESCRIPTION	FUNCTIONAL	PBRS	ONNE		TEM	MISS	3	्रा स्ट		æ	COMMENTS: RECOMMENDATIONS:
(2) (3) (4) (5) (6) (7) (10) (11) (12)  b) 11 1666 causing the greater te-analogous put to law property drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive the greatest drive drive drive the greatest drive drive drive the greatest drive	ġ	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	<u> </u>	MOCNI	SSOT	DAMAGE		FOTENTIAL	EATCETAG YE ROTAREGO		TILITARORY EMBRADOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)
(cont'd) b) 11)	11	(2)	(3)	3	(5)	છ	-		6)	(10)	(11)	(13)	(13)
	•												

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

WAEC-91-7958

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLS

DMG. NO./REV.: 620310

NAME:

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93		SMOTTAGNAMMODAG . STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	icated by on just the ed for the	If this information is lost, the LSO can be informed by PRI-PLY via the ship's intercommunication system.
•			COMPENSAT	2)	at is being recovered on each Landing is indicated by tate of Descent scale and the Entercom station just Flight and is used for verification between the segment, incandescent lamp indicators are used for the	If this info 150 can be in via the ship' system.
	RE - HAZARD	30	THORMSON	(11) (11)	covered on each teach used for verifit descent lamp ind	<u> </u>
	FAILURE	ĺ	DETECTAB BY OPERATOR	(10)	being re f Descent t and is t, incar	×
		MISSION	FOTENTIAL POTENTIAL SECT	(6) (8)		1 "
	ž	-	DAMAGE	(7)	t type th ween the m Primary Seven-	·
	BFFECT	SYSTEM	SSOI	(9)	ircraft ed between le fige overed.	1
		PRESONNET	MUCKI	(2)	affe e figne	r
		PBP5	FIAES	Ξ	to by	l .
		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	tion - Refer to Figure 9. The electeft ty These characters are displayed between this display is set up by signils from Pri n the glide-slope path to be recovered. Se	a) No indication  1) Loss of DC atimulus from consols con- nector 32 (Aircraft Type Desig.) caused by animal break down in cable W221 and/or Signal Junc- tion Box (Unit 4Al), ii) Loss of in- ternal con- sole circult ry path bet- ween 32 and 1A6Al, iii) Loss of DC input supply (0-5v) to 1A6Al from 1A6Al
		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Compole Aircraft Designator Indication one alpha and one numeric character. To below the ACLS status indicators. This recovery set-up and the sircraft in the alpha-numeric sircraft type characters.	
		ITEM	ç.	ε	13.0	

Hazard Lowel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Neoligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Imrossible) NOTE

96 (A-80)

# (FAJLURE MODES & EFFECTS AMALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

UNIT 1 TABLE

HAE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.:

NAEC-91-7958

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				NAEC-91-7958
	SHOTTAGNAMMODER - STREET	yn i	(13)	
HAZARD	30	THE STATE OF THE S	(13)	
1	63	TANGETTSSAND SVST (GASARI)	(11)	
FAILURE	27 <b>27</b> 1	DETECTAB BY OPERATOR	(10)	
	ION	POTENTIAL LOSS	(6)	
	MISSION	SSOI	(0)	
S S	SYSTEM	DYNYCE	(7)	
EFFECT ON:		SSOI	<b>(y)</b>	•
S 1	PERSONNE	THOCKI	(2)	
	PERSC	SZAIT	(3)	
SINCOGRAM	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	tw) input voltage to 1h6n1 through console one nector 14 (DC Fower), voltage (LED) segments of seven segment indictors in assembly 1h6n4.  vi) Component failure with in the population of 1h6n4.  vi) Component failure with in the population of 1h6n4.  vi) Component failure with in the population of 1h6n4. the hold of 1h6n4. the hold of 1h6n4. the hold of 1h6n4 the hold o
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont.d)
	ITEM	ġ	(1)	77.0

Mazard Level, Column 11, per MIL-STD-862A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; TV-Negligible)
Hazard Probability, Column 12, per MIL-STD-862A, para. 5.4.3.2 (A-Frequent: Peleasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improbable;

97 (A-81)

NOTE:

THE PARTY OF THE P

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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, 3					
		* SNOT+ EUNDAMNOOS - STNAWNOOS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES)	(13)	Mecognizing the malfunction, the LEO will have to depend on solution above.
	HAZARD	PROBABILITY OF		(12)	<b>M</b> 2 .
	•		TACITICAAD TACATICAAD	(11)	λ1
	FAILURE	271 271	SATDETEC YE ROTAREGO	(10)	и
		MISSION	POTENTIAL ROSS	(6)	1
		MIS	SSOI	(8)	•
	r on:	SYSTEM	DAMAGE	(2)	
	BFFECT		SSOI	(9)	1
		PERCONNET	MUCKI	(2)	
		SHE	FIAES	€	1
	917074	FUNCTIONAL	FAILURB MODB (HAZARD RELEASE MECHANISH)	(3)	vii) Loss of in- tensity caused by wiper lift- off in inten- sity control potentio- seter [A1778] or open in control switch [A178] b) Single un- changing, per- tial, or erron- eous indication, i) Component failure vithin [A6A4 Andicator assembly causing BCD decoder/ drivers to synthesize alphanuseric arcreft type in error, ii) Failure of test lamp switch lA1787 in the closed post- tion causing
		ITEM DESCRIPTION	(COMPUSERT, MUSE OF OPERATION, FUNCTION)	(2)	(cont.d)
		ITEM	X	Ξ	e ii

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hezard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improssible)

MOTE:

98 (A-82)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

Sales Sales Sales Sales

NAEC-91-7958

TABLE: UNIT 1

MAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./MBV.1 620310

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				GALC-72-7330
	COMMENTS RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	
HAZARD	æ	TTTTEMBORS COMBRIDGO	(12)	
1	(50	INCITIESAD EVSI OKAME)	(11)	
FAILURE	37 1	DETECTAB BY ROTARAGO	(10)	·
	MISSION	POTENTIAL POTENTIAL	(6)	
	MIS	SSOI	(8)	
3	BYSTEM	DAMAGE	3	
BPPECT	BYS	SSOT .	(2)	
M	NNE	Kachi	(2)	
	PEPSONNET	TIAES	€	
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	segment indi- cator ele- ments to illuminate (resulting output indi- cation will be all 8's).
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(coat'd) b)
	ITEM	G	ε	13.0

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: U-Reasonably Probable; C-Occasional; D-Remote: E-Extremely Improbable; Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: U-Reasonably Probable; C-Occasional; D-Remote: E-Extremely Improbable; F-Improbable; C-Occasional; D-Remote: E-Extremely Improbable; F-Improbable; C-Occasional; D-Remote: E-Extremely Improbable; F-Improbable; F-Improbab NOTE;

99 (A-83)

#### (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

tIAEC-91-7958

UNIT 1

TABLE:

(Sub-eystem) HEADS-UP-DISPLAY CONSOLE NAME:

620310 DMG. NO./REV.:

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	75 <u>6</u>							
		- BROTTAGNAMADOGA - STRAMADO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS)	(13)	ic Carrier Landing System (ACLS) is indicated just and three modes of operation. Hode I is a full landing The mode indicators are below the er and adar system or alroraft response to the flashing light helow the Mode lamps. The flash  x IV D If this information is lost, the LSO can be informed via the ship's intercommunication system. Regardless of LSO action, the about of an aircraft not adhering to flight path is automatic.			
	HAZARD	<b>.</b>	ZONGARITOCO	(12)	of System of the finding of the find			
	•		TANDTITESAED BVAL OMASAH)	(11)	er Landi The sea adar sys g light			
	FAILURE	21 21	EATTECTAB BY ROTARETO	(10)	le Carri			
		MISSION	POTENTIAL ROSS	(6)	Automa Lock-O Compu h blue			
	<u></u>	$\vdash$	SSOT	(8)				
	No st	SYSTEM	DYMYCE	(7)				
-	RFFECT		SSOI	(9)	e a line daile			
		PERSONNET	MOCNI	(2)	The operating statu The operating statu tooch and Mode III is f wien da a ob alned so of f signal a dis from the control of the control			
		98	SZAIT	€	ON THE COMPANY OF THE			
		HAZARDOUS- FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM)			at to Pigure 9. The operad Indicators The ACLS ment landing approach and states a wave-off whon dade. The ACLS wave-off signal 180 per minute.  a) No indication  1) Loss of DC  atimulus from console connector 32  (Afrecaff Type Desig.)  caused by signal break-down in cable down in cable tion Box  (Unit 4AI),  11) Loss of internal conternal conternal conternal concolulity path between 32  and 1A6AI,  141) Loss of DC  input voltage (+12v)  to 1A6AI,  to 1A6AI,  from 1AA,			
		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Consols ACLS Status Indicator - Nefer to Figure 9. The operations and all of cators. The ACLS ACLS landing. Node II is an instrument landing approach and lock-Om light. The ACLS system generates a wave-off whom dalanding instructions are questionable. The ACLS wave-(ff single instructions are questionable. The ACLS wave-(ff single instructions are questionable. The ACLS wave-(ff single instructions are questionable. The ACLS wave-(ff single instructions are questionable. The ACLS wave-(ff single instructions are questionable. The ACLS wave-(ff single instructional instructional instructional instructional instructional instruction instructional instructional instructional instructional instructional instructional instructional instructional instructional instructional instructional instruction instr			
		ITEM	Š	ε	ž.			
100 (A-84)								

Hazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; D-Nempligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Proquent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Impossible) MOTE:

100 (A-84)

leared Lev.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophio; II-Critical; III-Marginal; IV-Nayligible)
leared Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
 F-Improbable;

White buildings

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 1 TABLE: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. MO./RBV.1

620310

of 113 Page 56

17   17   17   18   18   18   18   18			y)		1
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI		COMMENTS DECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURE SAFETY CONTROLS)	(E1)	
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	AZARD			(11)	wil jailile
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	١,	10 (1	ingiticzaj evai orana)	(11)	12 17
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	PAILU	371	DETECTAB YE ROTARAGO	(01)	Marcina
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI		SION	POTENTIAL POTENTIAL	(6)	111
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI		MIS	SSOI	(8)	Ition
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	8	STEM	DYMYCE	3	7
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	PPBC	L	SSOT	9	phic
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	M	ONNET	YNUCKI	(3)	astro
ITEM (COMPONENT, MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCTION) (P. P. MODE OF PRINCE (M. P. MODE OF PRI	L	PERE	SZAIT	€	Cat
ITEM NO. 16.0		HAZARIJOUS- FUNCTIONAL	PAILURE MODE (HATARD RELEASE MECHANISM)	(3)	
ITEM NO. 16.0		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	azard Lewil, Column 11, per MIL-STD-88
8.44.49.49.4		ITEM	ğ	ε	NOTE: 1k

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

HAEC-91-7958

TABLE: UNIT )

(Svb-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

NAME:

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58					
*		- SMOLLEGNAMMODAR - STRAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	aide of the display panel is the Pilot elevision camera that monitors the gilde-slope in order to physically locate them in the el locaied at the extreme right of the Console vartical hold coltrols. A parallel power d permit the selbction of either internal chassis. They are included on the the operator's use. The arrangement for controls for testing and servicing.  x  IV D This is an aircraft line-up and redundant gildepath indicator to the iSO, and a back-up to the HUD display indicator. This failure sock would, therefore, cause no problem during the actual mission of the CV landings, and it would be corrected before the next one.
	HAZARD		TILLIEAGORS EDMENNICOO	(11)	the display pands to physically ly ed at the extreme hold coittols. the selection . They are inclusively as for testing and IV D
	1		enechticzaed Evel Grazah)	(11)	side of the dissipation camera in order to phys il located at the sertical hold co permit the sel chassis. They the operator's controls for te x
	FAILURE	1	DETECTAB BY SOTAREGO	(10)	of the left side of separated in order control panel localed in holy and vertical per cross and vertical per cross of ginal chassic parts of the operal in fernal controls.
		MISSION	POTENTIAL LOSS	(6)	he center of the left assis were separated to a PLAT control par horizontal hold and sand designate lals ness and contrast for ck to normal internal
	<u></u>	<b>-</b> -	SSOT	(8)	were sepa "LAT control contal hold designation of the contral in and contral in a contral in
	CT ON:	SYSTEM	DAMAGE	(7)	center of the ware of the ware of the ware of the ware of the standard of the ware of the
	EFFECT	L	TOSS	(9)	
		PRESONNEL	FIAES	(4) (5)	o the ship circuit control out brightness the chass the chass the chass switched by
		1.144	FAILURE MODE (HAZARD RELEASE MECHANISM)	(2)	- Refer to Figure which connects the picture tube and after, contrast, maint, loas are screwd in the sasis control as are screwd in the sasis control be removed and image).  1) Loss of console concaperor is console concaperor in canera video input to console connector is (video in) caused by discontinuity in cable W222 input to chassis (power supply assembly incapie w222 illuking the hamiliary Escretcy Box (Unit 2) with
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console PLAT Centerline Camera Moni Or Landing Air Television monitor (FLAY), approach of the landing alroraft. The available space of the console. Remote control panel and includes an on-off strong or remote operation. The two hold conconsole panel in addition to the normal remote operation permits the monitor to an operation permits the monitor to a service of the console panel in addition to the normal remote operation permits the monitor to a service of the console panel in addition to the normal remote operation permits the monitor to a service of the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation permits the monitor to the console panel in addition to the normal remote operation to the console panel in addition to the console panel in addi
		ITEM	.02	æ	9.

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

102 (A-86)

# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 LSO-UUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./RBV.1 620310

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_	_		_	NAEC-91-7958
	COMMENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	
HAZARD		PROBABILITY COCURRENCE	(12)	
	(Z	TYOTTOSAD SVSI OSASAH)	(11)	
FAILURE	27 271	EATCETAG BY ROTARAGO	(10)	
	TON	POTENTIAL POTENTIAL	(6)	
	MISSION	SSOI	(8)	
3	тем	DAMAGE	(1)	
EPPECT ON	SYSTEM	SSOT	(9)	
ä	NNET	XMOCNI	(2)	
	PERSONNET	FIASE	(4)	
O D O G G G G G G	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	11) the console ocnector 13 (AC Power),  111) Loss of A-C power to video monitor chassis 1A1 chassis 1A1 chassis 1A1 chassis 1A1 chassis 1A1 chassis 1A1 (10cal/remote) operation switch 1A12 (1A154 or control panel switch 1A12 (1A154 or control panel switch 1A12 (1A154 or control panel switch 1A12 (1A154 or control panel switch 1A12 (1A154),  1V) Loss of screen intersity control panel panel potentioner copen in the slement of control panel potentioner (1A17815, v) Component breakdown vithin the populations
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) a)
	ITEM	ģ	3	15.0

Hazard Luvel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 8-Nessenably Probable; C-Occasional; U-Remote; E-Extremely Improbable; F-Impossible) NOTE

103 (A-87)

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

UNIT 1 TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME:

620310 DMG. NO./REV. 1

8				
	Comments becommended.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	• It is recommended that the CRT and Noke be enclosed by a protective cover if the only removal path is through the console front. The cover should be secured to the CRT envelope and provide access for the removal of the high voltage lead and connections to the CRT and yoke.
HAZARD		THURANDERS	(11)	
1	(7)	ITADITIESAID BV31 OMANNI)	(11)	**
FAILURE	ZI ZI	DETECTAB BY SOTAREO	(10)	•
	NOIS	FOZZ FOZZ FOZZ	(6)	1
	MISSION	SSOI	(8)	
Š	SYSTEM	DAMAGE	(7)	*
EFFECT ON:	SYS	ross	(9)	•
2	MINE	ERUCKI	(2)	×
	PERSONNEL	TIAES	3	1
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	v) of the video monitor chassis 1A1 and/or CRT/Yoke assembly 1A8 causing 1oss of video drive to CRT loss of video drive to CRT ander, olver to yoke.  b) Airborne spilntered glass.  i) The PLAT CRT and yoke assembly (1A8) must be resconded from the console from the plastic faceplate and its reservaining bezel are removed. The unprotected CRT neck can be dealt a glancing blow causing the tube to
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd)
	ITEM	0	ε	15.0
				104 (A-88)

NOTE: Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Improsable;

NAEC-91-7958

# (FALLURE MODES & FEEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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UNIT 1 TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

DMG. NO./REV. 1 620310

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			-	NAEC-91-7958	_
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)		astrophic; II-Critical; III-Margina; IV-Negligible) (A-Froquent; B-Rackworthy Probable; C-Occasional; D-Remote; E-Entremely improbable; F-Incomplished
HAZARD	20	YTT. II.EA.BORG DAGNIUCCO	(11)		(I-Catastrophic; II-Critical; III-Margina;; IV-Negligible) 4.3.2 (A-Froposities B-Manderschip Probable; C-Occasional; D-F-Imposities)
,	(T)	TVOTTICZĄD ZVZI GYAZĄH)	(11)		C-Occas
FAILURE	ट्या ट्य	EATCETAG YE YOTAREGO	(10)		I-Maroina Probable;
	HOI	POTENTIAL POTENTIAL	(8)		I Arga
	MISSION	SSOI	(8)		itical oserv
ş	SYSTEM	DYMYCE	(3)		1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
EFFECT ON:	SYS	SSOT	(9)		strophic; II- A-Frequent: 8 F-Impssible)
131	NNET	Knoeni	(3)		strop A-Fro
	PERSONNET	TIAES	3		1 (I-Cata 5.4.3 )
Silvage		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	il implode causing immediate injury to the maintenance maintenance personnel.	), para. 5.4.3.1 D-882A, para. 5.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont.d) b)	Hazard Lavel, Column 11, per MIL-STD-882A, para. Hazard Probability, Column 12, per MIL-STD-882A,
	ITEM	NO.	ε	15.0	NOTE: H.

105 (A-89)

Walter Balley

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME: (Sub-system) HEADS DMG. NO./REV.: 620310

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1	COMMENTS . RECOMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	left side of the LSO Console. The Manual Operated erative. The repeater is driven from the ship's pplied by 6.3V AC for the green indicators. The are red indicating danger. The system is 150 DC is e HOVIA controller grounding the other lamp intensity. The system has a separate on/off switch intensity. The system has a separate system intensity. The system has a separate system intensity. The system has a separate on/off switch intensity. The system has a separate on/off switch intensity. The system has a separate on/off switch intensity. The system has a separate on/off switch intensity. The system has a separa
HAZARD	30	PROBABILITY CCCURRENCE	(12)	de of the LSO Coheole.  The repeater 19 drive indicating danger. The controller grounding y. The system has a series in the defect detect dete
1		INCITICALIO EVEL GEASAH)	(11)	, w , a , a , a , a , a , a , a , a , a
FAILURE	371	DETECTAB BY OTARISTO	(10)	inoperative is applied by the left as which are red by the HOVLAN by the HOVLAN control of the left as a second control of the
	MISSION	POTENTIAL LOSS	(6)	tem is inojer:  when is support  mas, which are adon by it in  ontrol panel.
	MIS	SSOI	(8)	orporated by the g System is inol datum bar is suer lamps, which turned on by the and 'meatpall' ole control pane.
EFFECT ON:	SYSTEM	DYWYCE	(7)	
FFECT		ssoı	(6)	
M	PERSONNEI	THOCHI	(2)	
	SHE	SZAIT	€	reposition of the control of the con
Sicondagan	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(£)	igure 11. A MOVIAN is used when the Fre pilot sees for the 1 mahar lamps except in the proper amber ter is used to adjuic see controls are located by discontinuity in caused by discontinuity in cable W22 feeding console conrector 31 (MOVIAS).  11) Loss of lamp illumination control caused by discontinuity in cable W22 feeding console conrector 31 (MOVIAS).  11) Loss of datum bar 6.39 A-C lamp supply voltage caused by failure of transformer fine to the illumination caused by failure of transformer representation on the illumination caused by failure of transformer supply chassis 1814
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console MOVIAS Repeater - Refer to Visual Landing Aid System (MOVIAS) MOVIAS source and repeats what the "meathall" indicators are vertical accommon to one side of these lamps a terminal. A dual control potention to turn it off when not in use. The
	ITEM	<b>K</b> 0.	(3)	16.0

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fragnent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Imposible;

MOTE

The Mary of

106 (A-90)

Hazard Level, Column 11, per MIL-STO-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STO-882A, para. 5.4.3.3 (A-Frequent; P-Pussonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improbable;

NOTE

#### (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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	_			RAEC-71-730
	SNOTTENDER BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	· •
HAZARD		TILLIEAGORS CNEEDIUCCO	(13)	
	NO E	enasterio Eval Grasserio	000	
FAILURE	27 271	DETECTAL BY OPERATOR	(10)	
	TON	POTENTIAL LOSS	(6)	
	MISSION	SSOT	(8)	
š	SYSTEM	DAMAGE	c)	
BPPECT	SYS	SSOT	(9)	
8	MNEI	XHOCNI	(2)	
	PERSONNEL	SZAIT	3	
	PUNCTIONAL	FAILURE PODE (HAZARD RELEASE MECHANISM)	(6)	11) (or loss of 115V A-C to 11
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont.d)
	ITEM	ģ	(3)	16.0

107 (A-91)

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# (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME: (Sub-aystem) HEADS-DMG. NO./REV.: 620310

NAEC-91-7958

5	<u> </u>		=			
		SNOITEGNAMWOOJA STNAMWOOJ	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	of communications available at the console. storage box for the console. The radio handset did handset, along with the "pickle switch"  It-receive channels are available for use with 458/510) is mounted on the right side of the 458/510) is mounted on the right side of the Carrier Traffic Control Center (CATCC). All the LSO will communicate with PRH-FLY and CATCC via existing sound powered communication circuits.	
	HAZARD	- A	PROBABILITY COCUMICACE	(11)	forms of communications available, the storage box for the console. The radio hander, along with the renamit-receive channels are available (15-458/514) is mounted on the x and the Carrier Traffic Control Cens.  - x IV E Upon the grand of the properties of the renamination of the properties of the p	
	ı		ITVOLTICZAJO SVZI GRAZAH)	(11)	unication for an analysis of the change of the month of the month of the change of the	
	FAILURE	37	DETECTAB BY ROTAREGO	(10)		
		NOIS	POTENTIAL POTENTIAL	(6)	form form for (L) for (L)	
ļ		MISSION	SSOI	(8)		_
	8	SYSTEM	DAMAGE	(7)	pperator has to right and belonges. Seesralition station Station Station of the real plants of the real plan	
	EFFECT	BYS	SSOI	(9)		
	10	NNEI	YAULKI	(2)		
		PERSONNE	LIVES	3	the LSO nted to the LSO nted to the LSO nvenient a ercomunic primary Planary P	_
		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	Refer to Figure 12.  Abone handset is moust in the aircraft of the console for octal the console for octal the console for octal in the powered from 1 it is powered from 1 it is powered from 1 in the signal path between 'prifit' and 'CATCC' caused by discontinuity in cable W125 and console connector 155 (Interfamily in cable W125 and console connector 156 (Interfamily in cable W125) and console connector 156 (Interfamily in cable W125) and console connector 157 (Interfamily in cable W125) and console connector 158 (Interfamily in cable W125) assembly.	
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Consols Intercommunication System - Rai An outlet junction box for a radio phonis us used to communicate with the plats is book to the front bar at the base of the this radio phone handset. A standard, Consols above the control panel. It contols are on the front and is of its controls are on the front and and the controls.	
		ITEM	Q	3	17.0	

Hazard Levil, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Harginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible)

NOTE:

108 (A-92)

### (FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

i

NAEC-91-7958

TABLE: UNIT 1

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME:

DMG. NO./REV.: 620310

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				NAEC-91-7958
	COMMENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	are located on the consola front. These control panel functions include the splay, and the FLAT monitor. The snumerated display indicators are action it within the DS3. The switch and indicators indicate delayed AC on, Ship's AC II D NOTE: Refer to individual worksheets for criticality impact of separate control failure.
HAZARD	<b>3</b> 0	PROBABILITY OCCURRENCES	(13)	ted on to the total of the tota
1		TYOTTISALD BVBI (BASAH)	(11)	displays are located on the control panel da-Up-D-splay, and the choice of the enumerated displaying the solutions of indicate delayer x II D
FAILURE	ETE	EATCETEC YE ROTAREGO	(10)	tapla; net. of ch of ince and
	MISSION	POTENTIAL ROSS	(6)	Sole .
	MIS	SSOI	(8)	la for the console designed with the pretting working, working the electron of
Š	SYSTEM	DAMAGE	(1)	controls for the fashley in Calle rettingly in Calle rettingly in Calle retting in termal controls is and three in a for testing
EPPECT	SXS	SSOT	(9)	controls for the special state of the special
M	NNET	MUCNI	(2)	All controls the upper displ era, cale ret; ins htern) c verrine for tes
	PERSONNEI	SZAIT	(4)	the unit the
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Figures 3 and 13 11 directly below to adjust the in- insy interlock Lisay interlock and Heads-Up- Display control and Heads-Up- Display control and Heads-Up- Display control indicator pointer and acale inten scale inten scale inten and poken- tiometer lines ba- tween lait and the control and the cother con- scale and HED read- outs. This initial condition is caused by discon- tiometer lines ba- tween lait and poken- tiometer lines ba- tween lait and poken- tiometer lines ba- tween lait and poken- tiometer lines ba- tween lait and discon- tiunity/
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Console Operating Controls - Refer to controls are mounted on a control pane power switching (on/off) of the console control panel contains the capability and scales. The Cincols contains an auxiliary part of assembly laif and respect on, and heater power on.
	ITEN	<i>ું</i>	ε	9

Mazard Lewel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catamitrophic; II-Criticul; III-Marginal; 7V-Naxiligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 8-Ressonably Probable; C-Occasional; 7-Remote; E-Extremely Improbable;
F-Impossible) NOTE

.. Visite Building

109 (A-93)

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(FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O ISO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 1 TABLE

**:** .

(Sub-system) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV. NAME:

95					
		- SWOTT-COMMENCE - STORES	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	Loss of panel backlighting will limit the use of the LSO console under subdued swhent light conditions (e.g., stormy weather or night recovery).
	HAZARD	æ	PROBABILIZA EDMEMBER EDMERNES	(12)	<b>a</b>
	ı		irottiskid Sval Graski)	(11)	=
	FAILURE	371 21	DETECTAB BY COERATOR	(10)	×
		ION	POTENTIAL S201	(6)	1
		MISSION	SSOI	(B)	1
	ž	rem	DYMYCE	(7)	l ,
	BPPECT ON	BYSTEM	SSOI	(9)	1
	RF	NNET	ENCULNI	(2)	1
		PRONNET	SZAIT	€	1
		FUNCTIONAL	FAILURE MODE (HAIARD RELEASE MECHANISH)	(3)	resistance internal to the 1A17 interface connector pairs 1A1711 IMIP20 IMIPAD
		ITEM DESCRIPTION	OPERATION, PUNCTION)	(2)	
		ITEM	Š	3	•
					110 (A-94)

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Men'igible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; P-Remote; B-Extremely Improbable;
F-Improssible)

110 (A-94)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 150-HUD CONSOLE SYSTEM

UNIT 1 TABLE: (Sub-system) HEADS-UP-DISPLAY CONSOLE NAME:

620310 DMG. NO./RRV.1

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	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)		mely improbable;
	COMMENTS	COMPENSATION (ACCIDENT PREY SAFETY			1. (I-Catastrophic) II-Critical; III-Marginal; IV-Neyligible) 5.4.3.2 (A-Frogues): 8-Vaccoumbly Probable; C-Occasional; N-Remote; E-Extremely Improbable; F-Improsible)
HAZARD		YTLILE/ARCHY ENGREEDOO	(13)		eqligible sional;
	(T)	TPOTTICZAJO SVZJ GMZAH)	(11)		al; IV-N; C-Occas
FAILURE		DETECTAB BY GOTARATOR	(10)		-Margin Probable
	MISSION	POTENTIAL POTENTIAL	(6)		It II
_	МІВ	ssor	(8)		rittic.
BFFECT ON:	SYSTEM	DYWYCE	(2)		
FECT	SYS	5501	(6)		hics gueri
25	NNEI	XHOLNI	(2)		atrophics II- A-Froquen's B F-Impossible)
	PEREGNNET	SZAIT	(1)		3.2 (
-SIMODORS-H	_	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	1) feeding cor- sole con- nector 33 (AC Control)  11) Loss of low voltage to adge-lit assembly caused by open in 6.3V A-C transformer 1A72.  111) Loss of in- tensity and/or power caused by viper lift- off in intensity control potentio- mater IA178 or open in control switch IA1782.	para. 5.4.3882A, para.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(d (b' rain)	NOTE: Mazard Level, Column 11, per MIL-STD-882A, lazard Probability, Column 12, per HIL-STD
	ITEM	<u>ું</u>	8	18.0	NOTE: HE

111 (A-95)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 1 TABLE

NAME:

(Svb-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV. 1

620310

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	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	proxidity and directional warring to carrier personnel the LSO concole is pounted, contains limit switches t subsystem). The limit switch actuates the of orientation for use, but not in use (console  - x III D The pedestal switch is the single element preventing obstruction lamp energization. Failure of the lamp to illuminate solute indicate maintenance for its remedy.
HAZARD		YTT.TITEASORY ENGINEERO	(12)	directional warrole is nowited. The limit switch on for use, but a
•	(T	ITADITIESALD EVEL GEASAH)	(11)	directions the line on for un for un III
FAILURE	21 21	DETECTAL BY OPERATOR	(10)	proximity and the table of of orientation orientation of orientation orientati
	MISSION	POTENTIAL S201	(6)	
L		SSOT	9	upon which if they und capable
EFFECT ON:	SYSTEM	DAMAGE	(2)	
EFFEC		SSOI	(9)	tion tamp i assimbly ydraminic anclosure x = - x
-	PEREONNEL	YMUCKI	(2)	<u> </u>
	PER	LIVES	€	The obstruction tiss-  iss-  control  ins-  control  ins-  control  ins-
HAZARDOUS-	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	rigure 14.  consider (1)  a is out of 1  a is out of 1  thon of obstructi  lamp.  1) No cir. path b ween A power put vi conscionacy  conscionacy  Ji and ob tion of conscionacy  and obstruction open/h  in a path open/h  liary
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Consols Obstruction Lamp - Refer to Figure 14.  of a non-operating (dark) deployed 150 consols.  actuated by the movement of hydraulic cylinder obstruction lamp when the HUD consols is out of obstruction lamp when the HUD consols obstruction lamp.  1) No c path power switch off).  1) No c path ween power switch off).  1) No c operation of the consols of the consols obstruction lamp.  2) 2) 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3
	ITEN	o.	(1)	0 9 112(A-96)

Hazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticol; III-Harginal; IV-Nevilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; B-Extremely Improbable;
F-Impossible)

William Dellar

112 (A-96)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM HAEC-91-7958

UNIT 1 TABLE

NAMB:

(Sub-aystem) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV.

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BPPECT ON: PAILURE - HAZARD	PUNCTIONAL PERSONNEL SYSTEM MISSION A C 63 6	HAZANDOR HODES  HAZANDO RELENTOR  CHAZANDO RELENTOR  CHAZANDO LEVE  LOSS  LOSS  LOSS  LOSS  LOSS  LUTURA  LOSS  LUTURA   (3) (4) (5) (6) (7) (8) (10) (11) (12) (13)	caused by increal increal increal increal increal increal increal increal increal increal increal increal increal increal increasion of medicinal depression of medicinal increasion of the atraxian animar case antich by linear case antich of the atraxial increasion of the atraxial increasion of the atraxial increasion of the atraxial increasion of console increasion of con		
	ITEN ITEN DESCRIPTION (COMPONENT, MODE OF NO. OPENATION) FUNCTION)			0.61	

113 (A-97)

Mazard Level, Column 11, per MIL-STD-882A, pare. 5.4.3.1 (I.—Zatastrophic: III—Marginal; TV-Necligible)
Hazard Probability, Column 12, per MIL-STD-882A, pare. 5.4.2.2 (A-Frequent; B-Rasonably Probable; C-Occasional; P-Remote; E-Extrymely Improbable;
F-Impossible)

NOTE

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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28				
	COMIENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			dge hater to maintain the inide of the cabinet condensation and equipment corrosion.  ocated in assembly 11.6) whenever the inside cabinet  OoF and +9507.  The failure of 11.6 to provide some degree of dehumidification will be detected during the maintenance cycle - lack of heater energization is indicated by DS3 and 11.6 viewed inside the console.
IIAZARD	30	DECEMBELLITY SPORABILLITY	(12)	the instant equipped by the D
		ITADITICZAID EVZI GEASAH)	(11)	dge hater to maintain cabinet condensation decated in assembly IA.  Our and +95°P.  IV
FAILURE	37	EATTECTAB BY ROTAREGO	(01)	corrorates a cartridge hater to ibility of internal cabinet cond heater cartridge [located in ass to cycle between +900g and +950g.
	MISSION	POTENTIAL POTENTIAL	(6)	Cabt Cabt Oor a
	MISS	SSOI	(8)	artra arnal ge (1 en +9
NO.	SYSTEM	DAMAGE	(7)	of increase and in
EIPECT	SYS	SSOI	(9).	rity fer c cycle cycle
2	NNE	XXULNI	(2)	incorporation and an application and a section and a secti
	PERSONNET	SZAIT	(4)	sole incorporation to see the beater of spore to
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	unsors permit the co- +950p to reduce   1 parallel, energentlel, energ
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Console Debusidification - Refer to console at an elevated temperature of Two heat sensors, HSl and HS2 wired in temperature falls below +90°F. The selection of the sensors of temperature falls below +90°F. The selection o
	ITEM NO.			20.0

Meased Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.i; III-Harginal; 7V-Neuligible)
Meased Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Propuent; B-Reasonably Probable; C-Occasional; P-Romote; E-Extremely Improbable;
F-Improbable; MOTE

William Market

114 (A-98)

Hazard Lavel, Column 11, par MIL-STD-882A, para. 5.4.3.1 (I-Cv astrophic) II-Critical; III-Marginal; IV-Neyligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquant; D-Massonably Probable; C-Azcasional; D-Manote; E-Extremely Improbable;

NOIE:

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

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market services

TABLE: UNIT 1

(Sub-ayetem) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.1 620310

NAMB.

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				NAEC-91-7358
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; BAFETY CONTROLS)			•
HAZARD	3D	YTT.TT.BA.80.84 DASHAUCOO	(13)	
1	(E)	TEOTTESAD TROTTESAD	(11)	
FAILURB	371 371	DETECTAB BY COTARIGO	(10)	
	MISSION	POTENTIAL POTENTIAL	6	
	MIS	SSOT	€	
No	SYSTEM	DYNYCE	ε	
BPPECT ON	ш	SSOT	9	
<b>2</b>	PERSONNE	MOCNI	3	
	PBRS	TIAES	€	
GIOGGA	FUNCTIONAL	FAILURG MODE (HAZARD RELEASR MECHANISM)	(3)	heater car- tridge power 6 con- trol caused by failure of both heat sen- sors (HSI 6
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(CODER '4) A)
	118M No.			30.0

115 (A-99)

# (EALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SA . . TANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

UNIT 1 TABLE

(Sub-eystem)

NAMB:

HEADS-UP-DISPLAY CONSOLE

MAEC-91-7958

of 113 Page 71 620310 DMG. NO./REV.1

		COMMENTS RECOMMENDATIONS COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	coult voltage regulators; the IAA regulador board assembly produces uliry that safety shutes down the regulador if for any reason it  circulted output, and high ambiest tempelatures, but does not give  - x x II C The varied voltages created by the regulator board assembly in tandem with the Audiliary Electronics Box provide the energization of the instrumentation critical to the landing signal officer decision process. Fallure of these supplies magnify the change of information loss. The predominant fallure mode, an inoperative console readout, can cause an extraneous fallure elsewhere due to a weak design in the console power supply circultry. Howe of the regulator circultry is suffic- ciently buffered within the common buss will cause the respective regulator circult on a common buss will cause the respective regulator troughout the con- sole. In tandem with this sole. In the addition of should be the addition of	
HAZARD	30	YTTTTENEORY YTTTTENEORY YTTTTENEORY	(12)	ed circuit voltage regulators the IA regular supplies in the Auxiliary Electron os Box gricultry that safety shuts down the regular short circuited output and high ambient temperature of preduce voltages of +15, +12, +8, -6, Al788 x x II C	
1	(	DINOTHESAED EVAL GHAZAH)	(11)	- (新音響音	
FAILURE	30	DETECTAB BY SY OPERATOR	(10)	Using integrated circuit voltage regulators persisted by requiring the formal power supplies in the Aukiliary persisted bobless such as short circuitry that safely shuts solity. The regulators preduce voltages of the potentiometer in 1780.  The regulators preduce voltages of the potentiometer in 1780.  The regulators preduce voltages of the potentiometer in 1780.  The regulators and his way and the control of the control o	
	MISSION	FOLENTIAL	(6)	t safe recut on the Au	
-	<u> </u>	SSOT	(8)	t the total the	
EFFECT ON:	SYSTEM	DAMAGE	(2)	ed circuit.  Transples  J circuitry  Short circuitry  N1788 .	
EP E	SI S	SSOI	(9)	ried clr	
	PERSONNET	XXUCNI	(2)	ntegrac Leaf pow Lech as Meter I	
L	80	SZAIT	3		
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	to Figure 16. Using integrated circuit whe + 20V and +5V requisted power supplies in built-in temperature-sensing circuitry device from problems such as short circular temperature-sensing circuitry device from problems such as short circular temperature-sensing circuitry device from problems of con-sensing circuitry device operature scale operature scale operator caused by breakdown in cable will cable with the wolfs to july feedbard to console via console via console via console via console via console via console via to its feedbard the console via console via console via console via console via to its feedbard the console via console via console via console via console via to its feedbard the console via console via console via console via to its feedbard the console via console via to its feedbard the console via console via to its feedbard the console via console via to its feedbard the console via to its fe	
	ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FURCTION)	(2)	Consols DC Power Requistors - Referite internal supply voltages from integrated circuit regulators contribecomes too bot. This protects the protection against input voltages doutput of sero to +5 volts (control output of sero to +5 volts)	
	NO.			21.0	

Num 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Imrossible; 11) Loss of +15 +12, and +8

116 (A-100)

Se was a second

# (FAILURE MODES & EFFECIS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-UUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 1

NAME: (Sub-aystem) HEADS-UP-DISPLAY CONSOLE

TABLE:

DMG. NO./REV.: 620310

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				NAEC-71-/938
	COMMENTS - RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	overvoltage protection on each DC line to prevent damage to decoupling and transient protection components and to prevent exaggerated/non-linear indications and/or complete failure of a vital indicator.
HAZARD	3 30	YILLII MAGARI EDKERNUOCO	(113)	e tutpitų
t		ITADITIESAID SVSI (SIAZAH)	(11)	#HAX C
FAILURE	टा बग	DETECTAB YE OPERATOR	(30)	Margina
	MISSION	POTENTIAL LOSS	6	
	MIS	SSOI	(8)	Itica
Š	SYSTEM	DAMAGE	(1)	\$7.1 11
EFFECT	SYS	SSOT	(9)	hics
區	PERSONNEI	YMUCNI	(5)	astro.
	PEPS(	SZAIT	Ξ	1-0-45
010000	FUNCTIONAL	FAILUKE MODE (HAZAKD RELEASE MECHANISM)	(3)	ii) volt out- puts caused by internal failure of VRI, VRZ, and VRZ, and VRZ IC regulators and/or failure of PS3, the +20 volt power supply in the Aux- illary Blectronics Box (Unit 2), iii) Loss of -6 and -15 volt out- puts caused by internal failure of VRA and VRE IC regulators and/or failure of puts caused by internal failure of vRA and VRE ic regulators and/or failure of vRA and vRE ic failure of vRA and vRE ic failure of vRA and vRE ic failure of vRA and vRE ic failure of vRA and vRE ic failure of vRE ic failure of failure of failure of vRE ic failure of failure of vRE and vRE ic failure of failure of failure of failure of failure of vRE and -20 volt power sup- ply in the duxillary Electronics Box (Unit 2), strange failure Box correct Strange failure Strange failure Fower sup- ply in the failure of f
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	
ITEM NO.			(3)	NOTE: HE

117 (A-101)

(FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

UNEC-91-7958

UNIT 1 TABLE

(Sub-eystem) HEADS-UP-DISPLAY CONSOLE NAME:

620310 DWG. NO./REV.

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	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAPETY CONTROLS)			·
HAZARD	30	YILLIAASORU DAARRIDOO	(13)	
T	(T)	ITADITICZAID SVZI OSASAH)	(F)	
FAILURE	1	DETECTAB BY GOTARAGO	(10)	
	MISSION	POTENTIAL LOSS	(6)	
	MIS	SSOT	(8)	
T ON:	SYSTEM	DYWYCE	(7)	
EFFECT		SSOI	(9)	
	PERSONNET	YAULKI	(2)	
-	PEP	TIAES	3	
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	iv) Loss of variable zero to 45 voit output caused by internal component failure in hybrid olr-cultry and or failure of FSI, the 45 voit power supply in the Auxiliary Electronics Box (Unit 2).
				3
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUGCTION)		(2)	(cont'd)
	ITEM NO.			118 (A-102)

Hazard Lew.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraphent; B-Reasonably Probable; C-Occasional; D-Renote; E-Extremely Improbable;
F-Inprobability

NOTE:

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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NAEC-91-7958

UNIT 1 TABLE:

(Sub-aystem) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.

NAME:

620310

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_		<del></del>				NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			The display pressures a faces mile of the rate of descent, rang motion, and aircraft range as 1A7, 1A10, and 1A9, along with an aircraft symbol superimp sed on reference crosslines horizontal instant, by conditioning higher information for presentation on a high intensity if the CRT is then projected to the comfluer plass assembly mounted on top of the console. He CRT is then projected to the comfluer glass assembly mounted on top of the console. He CRT is then projected to the comfluer glass assembly direcuit hoard (1A24), the HUD cassembly dark supply Assembly 1A14).  Induces the dynamic portion of the HUD system while the static portion, the measurement approximate portion of the HUD system while the static portion, the measurement at produces the dynamic portion of the HUD system while the static portion, the measurement at produce deflection in the X and Y directions, and a blank of signal that turns off at produce deflection in the X and Y directions, and a blank of signal that turns off race is not desired. The HUD GHT display Board takes input data, in the form of analog from lightle-to-handog (NA) converters hat are part of the steem (SPAH A2 radar). The NAMP MOTION signal is obtained from the Sh p's Harmonization external injerface cincults that develop the high-level signals required by the CRT.	(sluctrostatic forusing), and anoda voltage for the CRT yoke assembly.	The presentation of the MUD is a faceimile of the con- sole and as such is redundant. It would not cause any problem during the recovery. If the glidepath line-up information is lost, it is backed up by the PLAT centerline monitor.
HAZAKD		YTT.IIEAGORY EDMERRUCCOO	(12)	up-Display (ND) is supported or rate of despent, rash motion craft symbol superimposed on a put information for plesentations. It is not considered on the ND CKT bisplay direct or ystem while the static portion ystem while the static portion system (reference 5.0) and ut display circuit boid productions, and a blanking significations. It display circuit boid productions, and a blanking significations of the shall be obtained from the Shipplas is obtain	using), tbly.	a .
1		TYPOTTIEZALD EVZI ORAZAR)	(11)	superimpon for post of the pos	voltages (sluctrostatic forusing to dilve the CRT yoke assembly.	1
FAILURE	37	DETECTAB PY ROTARIGO	(10)	symbol iformati iformati iformati ilass as while t while t splay ci ons, and and take log x an analog (	Blactros	M
	NOI	POTENTIAL LOSS	(6)	-Up-to-to-to-to-to-to-to-to-to-to-to-to-to-	gos ( iva t	t
	MISSION	ross	(8)	The Meads-Up-D mile of the rattion my input i to the comminer of the comminer referred by the Mily Mily Mily Mily Mile in the Mile system oction lamp system comminer of the Mile of the M	grid volta	1
S.	SYSTEM	DYWYCE	(7)	The still of the s	grid	ſ
EFFECT ON:	<u>L</u>	SSOT	(9)	hru 17.5. The hrs a face mile of by along with a projected to the hrply Assembly Ass	voltages, on current	1
鱼	PERSONNEL	XXOCNI	(2)	presents a and 1/9, an inc-up, by then project bly (AMIS) wer Supply wer Supply manic portion in rediction in testical in the said in the		•
	PERS	FIAES	(4)	presection of the presection o	ament Ject í	1
OIL COOK BUILD	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(2)	Refer Dio. Cator: Cator: I and so of the I and the rd pr rd pr pr pr pr pr pr pr pr pr pr pr pr pr p	uit provides the filament ler provides the duilecti	A) No dynamic presentation-reticle scale information.  1) Loss of CNY assembly (1A15) operating voitages from CRT power supply assembly (1A14).
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Console Heads-Up-Display Circuitry - Refer to Figures 7-1 thru 17.5. The Heads-Up-Display (HUD) is supported by a series of elements resident within the LSO console. The display presents a face mile of the rate of despent, ramp motion, and alroratin information displayed on console indicators 187, 1810, and 189, along with an aircraft symbol superimp sed on reference crosslin representing the landing deck vertical and horizontal inserup, by conditioning liquit information for presentation on a high interpresenting the landing deck vertical and horizontal inserup, by conditioning liquit information presentation on a high interpresenting the landing deck vertical and horizontal inserup. The process of creating this is age to the CRT is then projected to the complex process of creating this is and the HUD CRT sessably (M15) is performed by the MUD CRT bisplay direction the measurement reticle scale and reference cross lines are provided by a reticle projection by system (reference 5.0) and combined with the moving pointers and synthesized aideraft symbol on the combiner gass. The HUD GRT display circuit board produces the crossing algorial in the X and Y directions, and a blanking signal that turns off the beam during intervals when a visible trace is not desired. The HUD GRT display solved takes input date, in the form of analogs for the CRT display should by a will be an excesses it into control adjunds (i.e., blanking signals from the X and Y directions, and a blanking signal that are part of ship's automatic aircraft landing ladar system (SPN-42 radar). The RMP MOTION signal dark system (SPN-42 radar). The RMP MOTION signal intervals with a diverse circuits that develope the high-level signals dark external interface circuits that develope the bigh-level signals darker at an expension of produces and processes in the CRT system (SPN-42 radar). The RMP MOTION signal is developed by the RMP MOTION signal signal darker as a second of produces and produces are seried to the cross signal darker as a second of produ	The HDD CRT power supply circuitie CRT. The HDD deflection amplifie	
	ITEM	Š	ε	93.0		

NOTE: Inzard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Inzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.1 (A-Propositionally Probable; C-Occasional; 19-Negmote; E-Extremely Imputability,
F-Impussible;

119 (A-103)

of 113

75

Page

#### (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-BUD CONSOLE SYSTEM

C TIND TABLE: HEADS-UP-DISPLAY CONSOLE (Sub-system)

620310 NO./REV.

MAEC-91-7958

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) CCCURRENCE - HAZARD PROBABILITY OF (HAZARO LEVEL) NOLLYDLIESYED FAILURE OPERATOR? (10) BX FOZENTIAL POTENTIAL 6 MISSION 8 RFFECT ON: SYSTEM 3 DAMAGE 9 SSOT 3 MUCKI Ξ TIAES FAILURE MODE
(HAZARD RELEASE
MECHANISM) lift-off in HUD CRT can be lift-off in intensity potentiomevoltages (+5V and +26V from Unit 2), 115VA-C bly) fallur within IAI (including (sup-assem intensity IN17R12, Internal component 0-c input tage from connector 33 (AC/AC Control), potentioconsole control loss of wiper panel meter 3 7 (COMPONENT, MODE OF OPERATION, FUXCTION) 3 (cont'd) 22.0 ITEH 3 ₹.

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Tmyseqbbe;

ter IAI4RI)

KOJE:

120 (A-104)

#### (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAEETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-aystem) HEADS-UP-DISPLAY CONSOLE

DWG. NO./REV.; 620310

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	_	<del></del>		NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			·
HAZARD	.ac	PROBABILITY ENGRANCEDO	(1.2)	
•	6.50	TROTTICZAD EVEL GRASAH)	(11)	
PAILURE	27 371	EATDETEC YE ROTARETO	(01)	
	MISSION	POTENTIAL POTENTIAL	(6)	
	MIS	SSOI	(8)	
Š	SYSTEM	DAMAGE	(7)	
EFFECT ON:	SYS	SSOT	(9)	
S	PERSONNET	YRUCHI	(2)	
	PERS(	TIAES	(4)	
BIIOGGEOGH	FUNCTIONAL	FAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	11) loss of CRT assembly ([Alis]) de- flaction current caused by loss of D-C input vol- trages (+20v from unit 2) 115V A-C 'delayed A-C' signal from onnector 13 (AC/AC Control), or loss of dutue from Hub CRT display circuit board [IA24] caused by caused by loss of b-C input vol- trages  111 loss of D-C input vol- trages
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(coat ' 4)
	ITEM	ġ.	(1)	22.0

MNE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-Faasonably Probable; C-Occasional; ID-Mamote; E-Extremely Improbable;
F-Tequesible)

W. B. Barrell

121 (A-105)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

Page 77 of 113 MAEC-91-7958 HEADS-UP-DISPLAY CONSOLE 620310 (Sub-eystem) DMG. NO./REV.1 UNIT 1 TABLE NAM:

ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION) (cone'd)	EFFECT ON: FAILURE - HAZARD	PUNCTIONAL PERSONNEI SYSTEM MISSION 19 C 23 8	HAZAND RELEASE HECHAN SHELEASE LOSS LOSS LOSS LOSS LOSS LOSS LOSS LO	(3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)	a) iiii) (+15V, -15V from 1M and -5W from 1M and +5W circultry between between between between (1,10,12) con- metitons (1,10,10) antale, in- termal com- ponent fallore vithin the population of the within blankin saymal caused or a conetant blankin saymal causeddown  [M.2]   In CAT	in CRT : saembly	
1 1 <u>9</u>				(2)	<b>7</b>		

Hazard Lowst, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Medigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraguent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improbable;

122 (A-106)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM MAEC-91-7958

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UNIT 1 TABLE (Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME:

620310 DMG. NO./REV. 1

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	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)			The LSO would utilize the PLAT centerline monitor as an alternative.	.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible) 5.4.3.2 (A-Fruyment; 9-Passomubly Probuble; C-Occasional; D-Remote; E-Extremely Improbable;
HAZARD		TITIEVEDIA S	(12)	404	ligible) onal; D-R
1		INOTIESAD 3V31 GRAVA)	(11)	) H	1, IV-Neg C-Occasi
FAILURE	l	DETECTAB EV ROTARETO	(01)	**	-Margina robuble;
	HISSION	POTENTIAL ROSS	(6)	f -	11, 111 doly
_	HIS	SSOI	9	ı	dtic. Vason
r ON:	SYSTEM	DAMAGE	(2)	•	stroyhic; II-C: A-Proysent; 9-f
EFFECT	L .	SSOT .	(9)	1	phic;
<u>a</u>	PERSONNE	YAUCHI	(2)	1	astro (A-Pr
	SHE	TIAES	3	•	1-Cot
SHOOMER	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	iv) short with- in CRT and/or open filament. changing indi- cation, non- linear res- ponse, pre- mature linear res- ponse, pre- mature linear res- ponse, pre- mature linear res- cation, on aircraft symbol, or incerect reference cross-line divisions.  i) Non-linear or limited output indication caused by internal failure of component within pop- ulation of lind.  ii) Incorrect reference cross-linear or limited output indication caused by internal failure of component within pop- ulation of lina.	A. para. 5.4.3.
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd)	Hazard Lew.1, Column 11, per MIL-STD-862A, para. 5.4.3. Hazard Probability, Column 12, per MIL-STD-862A, para.	
	ITEM	Š	3	22.0	NOTE: Ha

123 (A-107)

(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

A STATE OF THE STA

NAEC-91-7958

UNIT 1

TABLE:

(Sub-system) HEADS-UP-DISPLAY CONSOLE NAME :

620310 DMG. NO./REV.

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CT ON: FAILURE - HAZARD	8 53	COMMENCE  SHORNELT ILL  CHACKER OF RAYE  OPERATOR  DETECTAR  POSS  LOSS  LOSS  DAMAGE  DAMAGE	(7) (8) (9) (10) (11) (12)	
EFFECT	PERSONNET	SEATT  SEATT	(4) (5) (6)	th the the the the the the the the the t
	FUNCTIONAL	FAILURE MODE (HASARO RELEASE MECHANISM)	(3)	11) (distance per division with reference to the electronically generated aircraft symbol) caused by open in control switch in in in in in in in in in in in in in
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) b) 11) (d	
MO.			Ξ	23.0

; ; ; ;

Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligibie)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremoly Improbable;
F-Improbable;

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal: TV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Densorably Probable; C-Occasional; D-Romote; E-Extremely Improbable;
F-Investible)

NOTE:

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 1 TABLE

(Sub-system) HEADS-UP-DISPLAY CONSOLE

NAME:

DMG. NO./REV.: 620310

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$\overline{}$		<del> </del>	_			NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			, consists of an external bracket bousing to sds-Up-Display reticle seals projection lamp	<ul> <li>RECHEND: Wide wire mesh screen be placed over front face to preclude accident during maintenance.</li> </ul>	
HAZARD		THUBABLILLY DOCUMENCO	(13)	externa ticle ac	٩	
		eval orazah) Eval orazah	(11)	consists of an ls-Up-Display r	ä	
FAILURE	रा इन्	DETECTAB BY OPERATOR	(10)		×	
	MISSION	POTENTIAL LOSS	(6)	cover he He	1	
	MIS	ross	(8)	(Unit 1) back ure in which	1	
EFFECT ON:	SYSTEM	DYMYCE	(1)	onsole (Unit 1) back an fixture in which	×	
PFEC		SSOT	(9)		ı	
M	PERSONNET	XXOCNI	(5)		×	
	)SHB4	TIAES	(4)	the C	1	
SIROGRAFAN	PUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	ack plate assembly, the C as and a protected hold-do	A) Airborne aplintered - glass.	1) The pro- jection lamp, an evacuated 50-watt glass halogen, is profected from the rear only. It can implode if shat- tared front whenever the back plate is removed from the console console cabinet for maintenance (Refer to Figure 19).
	ITEN DESCRIPTION (COMPONENT, MODE OF OPERATION, FU.:CTION)			Console Back Plate Assembly. The lac store the PLAT monitor color filters is mounted.	-	
	ITEM NO.			23.0		

125 (A-109)

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 1
NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.; 620310

WAEC-91-7958

	_	S.				<del></del>	<del></del>			<del></del>		
	ONCIBECUMNOCUS OFNORMOC		(13)	device, projects the combiner glass. The combiner glass. The com storage to use, securing latch on the the base of vertical	6 SUPPORT ASS'Y (518586-1)			COMPINER ASS'Y FRAME (620320-1)	KNURLED RAOB			
HAZARD	æ	YTLIIAABORG SDKBBRIDDO	(12)	flectin smittan tions fr easing ght at	MIRRO			HOO				
,		GYASTETCATO GVAL GRASAH)	(11)	r spherical concave reflecting reflectance/70% transmittanter (2) During transitions (2) place by initially releasing knurled knob on the right at				1	6	•	<b>}</b> .	
FAILURE		EATDETEC YE ROTAREGO	(01)	erical collectance Duriby initial					<u></u>		ļ	*
	MISSION	POTENTIAL	(6)	r aph re 2) place			Ī					HUD FRONT VIEW
<u>.</u>	_	SSOT	(8)									- 25
EFFECT ON:	SYSTEM	DAMAGE	(7)	inch d incli frenc rhised								1
EPPE	L	SSOI	(9) (	a 10-1 or the or is r					· 			, , , r. 100 F. 100.
	PERSONNE	YAUCHI	(2)	scale upon the comsole The wirror		<del></del>		•			Ž.	
-	a	SZAIT	€				.516573-1		423830-1	3	HS26693-CA2	
91000	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	biner and Mirror Assembly. The HUD mirror, or combined with the statio reticle scale upware physically situated on top of the comes), are manually deployed (erected). The wirror is firmly secured with 10).		CAL MIRROR	TY PILTER		MAN LATCH (	RAMB LATCH 124364	1832 2 P.	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Heads-Up-Display Combiner and Mirror Assembly. The Hidynamic MUD CRT image combined with the static reticle mirror and combiner are physically situated on top of the mirror and glass are manually deployed (erected). console side panel. The deployed mirror is firmly sec arm (Refer to Figure 20).		SPIERICAL	MEUTRAL, DENSI		DQ PTOH			
	ITEM	<b>&amp;</b>	3	34.0							•	
				• •	6 (A-1	3.03						

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rassonably Probable; C-Occasional; D-Ramote; E-Extremely Improbable;
F-Improbable;

11

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

The Section of

UNIT 1 TABLE:

HEADS-UP-DISPLAY CONSOLE

(Sub-ayatem) NAME:

620310 DMG. NO./REV.

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EPPECT O	LOSS INJURA INJU	(4) (5) (6) (7	atop, and then absuring that the constitution of the constitution
EPPECT ON: ERSONNEL SYSTEM	INTOEX	(2)	to by complete the
N: H HISSION	TOEST	(8) (8)	SIDB V
FAILURE -	DETECTABI BY OPERATOR: CLASSIFICATION CLASSIFICATION CHANNE LEVEL	(11) (01)	PRESSION CNOBS TRACK
<u>a</u>	COMPENTS! RECOMMENDATIONS; COMPENSATING PROVISIONS CACCIDENT PREVENTION MEASURES SAFETY CONTROLS;	(12)	the trac holes to secure the

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: R-Reasonably Probable; C-Occasional; D-Remoter E-Extremely Improbable;
F-Improbable; NOTE:

WANTED THE SECOND

127 (A-111)

TANDE A

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 1

NAME: (Sub-system) HEADS-UP-DISPLAY CONSOLE

DMG. NO./REV.: 620310

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									1		
		HASABOOTS		EFF	EFFECT ON	, NC		FAI	FAILURE - H	HAZARD	
ITEM	ITEM DESCRIPTION	FUNCTIONAL	Iannogaal		SYSTEM	$\vdash$	MISSION	<b>3</b> 71	120	30	SNOTT-SUNBMINOS STRANGO
.0	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	TIAES	MUCKI	SSOI	DAMAGE	FOTENTIAL	LOSS PETECTAB	ROTARIGO TPOTTICZAID ZVZI GRAZAH)	YTLIISASORT DASHIDOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)
(1)	(2)	(3)	3	(2)	(9)	(2)	(6)	(10)	(11)	(113)	(13)
24.0	(cont.d)	a) Airborne splintered glass.	1	×	-	×		1	II	<u>a</u>	eIt is recommended that the following design changes be undertaken:
	·	i) Shattering of combiner glass caused by abrupt tiltover of spherical mirror support assembly (refer to Figures 20, 21, aggravated by loose tightening and/or abrupt lateral shock imparted by Restant of recovered all breakage of combiner glass caused by lapar as caused by lapar caused b									(1) Create a andwich of the combiner glass and a plastic neutral density filter on the observer side of the combiner glass, and of the combiner glass, but no compared to the side of the mirror and aupport assembly base to lock and maintain the aupport are in the vertical attitude regardless of the hnuried knob tension, and lincorporate a compression pin locking device on the spherical mirror hold-down latch.
		Vincinaing			7						

Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
f-Imrossible) MOTE

LINE BURG.

128 (A-112)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

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MAEC-91-7958

UNIT 1 TABLE

NAME:

(Sub-ayatem) HEADS-UP-DISPLAY CONSOLE

620310 DMG. NO./REV. 1

(Last page of Unit 1) Page 84 of 113

_				NAEC-91-7958
	- SGOTH GNAMMODAG - SANAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	
HAZARD		PTC.IT.EA.EOFT EDMENSHIDOO	(12)	
	(Z)	INVOTTICZĄJO ZVZI GRAZAH)	(11)	
PAILURE	37	EATOSTEC YE KOTAREGO	(10)	
	MISSION	POTENTIAL SZOJ	(6)	
	MIS	SSOT	(8)	
No.	SYSTEM	DYWYCE	(7)	
EFFECT ON:		SSOT	(9)	
	PERSONNE	YAUCHI	(2)	
	PERS	SZALT	€	
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	ii) loose tools during maintenance cycle), iii) Shattering of spher- toal con- caused by failure/ failure/ failure/ failure of hold-down latch and subsequent slapping motion against the cabinot face.
	ITEM DESCRIPTION	OPERATION, PUNCTION)	(2)	(cont.d)
	ITEM	<u>ું</u>	Ξ	3.0 2.0

NOTE: Hizard Lewil, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic: II-Critical; III-Marginal; IV-Neyligible)
Rezard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Franchile) Reasonably Probable; C-Occasional; I-Perrope E-Extremely Improbable;
F-Improbable;
F-Improbable;

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(FALLING MODES & EFECTS AWAYSIS - SYSTEM) SAFETY AMALYSIS MICH 1809 0 (SO-1100 CONSOLE SYSTEM

NAEC-91-7958

(Sub-system) AUXILIARY ELECTRONICS BOX TABLE: UNIT 2

NAME:

DMG. NO./REV.1

620381

-					
		COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	for the Life Console. This box is located directly for the Life Console. This box is located directly Electronics Box is secured to the inner surface a blower with air low detectors, elapsed time meter, s describes on the worksheets. Figure 2 illustrates, by ents, their supply voltage requirements, and operating
	HAZARD	.a.co	PROBABILITY OCCURBENCE	(12)	al Officer's (I
	١ (		TINOTTISSAD EVELI OHANAH)	(11)	O Landing Signal Officer' the LSO Console. This box tronics Box is secured to ver with air low detector oribes on the worksheets. their supply voltage requ
	FAILURE	27: 27:	DETECTAB BY COPERATOR	(10)	
		MISSION	POTENTIAL LOSS	(6)	o Later Land Correction of the
		MIS	SSOI	<u>8</u>	
	PFFECT ON	SYSTEM	DAMAGE	(2)	power supplies The Auxiliary also contains composition is
	FFEC		SSOI	(9)	power sug The Aux calso con a composi-
	ei.	PERSONNE	YAULKI	(5)	the second secon
		PERS	FIAES	€	the D.C the D.C The bull The box between
	HAT PROOFIGE	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	System Safety Analytis focuses on the MK 1 MOD n Figure 1.  Deficient box contains the D.C power supplies for box inside the ship. This box also contains a blo breaker.  Auxiliary Electronic Box's composition is destructed to be been been been been been been been
		ITEM DESCRIPTION	OPERATION, FUACTION)	(2)	This segment of the System Safety Analysis focuses on the MK Electronics Box depicted as Unit 2 in Figure 1.  The Auxiliary Electronic Box contains the D.C. power supplies below the LSO platform in a small room inside the ship's hull. The Auxiliary of this room. This is the outside skin of the ship. This box also contains plint light indicators and a circuit breaker.  A description of the Auxiliary Electronic Box's copposition is use of a block diagram, the input/output connections between each of its electronics.
		ITEH	O	ε	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improvatively NOTE

Walter State Street

130 (A-114)

(FATITIME NODES & EFFECTS AMALYSIS - SYSTEM) SATETY ANALYSIS MIX MIX 0 LSO-HIY CONSOLE SYSTEM

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NAFC-91-7956

TABLE: UNIT 2

NAME: (Sub-eystem) AUXILIARY ELECTRONICS BOX

DMG. NO./REV.: 620381

Page 11 of 8

NME: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic, II-Critical, III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; !!-Passonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAETY ANALYSIS MKI MOD O LSO-UUD CONSOLE SYSTEM

COMPENSATING PROVISIONS
ACCIDENT PREVENTION MEASURES
SAFETY CONTROLS) COMMENTS; RECOMMENDATIONS; ď \* J2 Page 111 (13)200 メ (12) **ENGREENCE** - HAZARD 705 NAEC-91-7958 CLASCIFICATION (HAZARD) FAILURE DETECTABLE
YE
OPERATOR? (10) POTENTIAL S201 MISSION 6 ce, SSOI 8 MAIN PWR EFFECT ON: SYSTEM 3 DAMAGE (9) SSOI EPSONNE (2) YAUCNI Ξ **FIAE**2 150 FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM) BOX HAZARDOUS-3 (Sub-system) AUXILIARY ELECTRONICS 85 1 (COMPONENT, MODE OF OPERATION, FUNCTION) 93 620381 (2) DWG. NO./REV.1 UNIT 2 TABLE: NAMB: ITEM 3 Š

AUX 121MYY ELECTHUML .. Ac/AC CANTRUL שכ/שב מחניסד PEDESTILL Swin オカ 42 CONSOLB NTA Ŋ MUTER THAN 1-4 ELAPSED 7 SQ & <del>2</del> ≠ Ø) 689 ξ 0) ന A.C. INIOUT +20 SQ ĥ Ø AUXILIARY ELECTRONICS BOX SUPPLIES Ø HUMM J-W PS2 -20 > 21/12 > S Power FIGURE O) 0, A.C INPUT ISU 0-6 1 5 > (V) 11500 'n INTERFACE MOVLAB SHIPS AWG Ŋ 783 782 10/ 5

...MOTER : Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable; F-Impossible)

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132 (A-116)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM NAEC-91-7958

(Sub-system) AUXILIARY RIECTRONICS BOX NAMB:

UNIT 2

TABLE:

620381 DWG. NO./REV. 1

Page tv of 8

Committee of the Commit

									 N	AEC-91	-7958		
	COMMENTS; RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		Find OSE	Ke	7/02						
HAZARD	30	YTLITEAEORY COCHREDOC	(12)		$\alpha'$	٦ / ي	MIR FLOW SWITCH		•				_
} .	(T	TAOTHISZAD EVEL GRANAH)	(11)			1	è	# 6 0 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					
FAILURE	371	DETECTAR YE TOTARETO	(10)			STUFI ING	1	VNIT 4 SYNCHRO					AUXILIARY ELECTRONICS BOX
	ION	POTENTIAL POSS	(6)		7 %	10	Ja .						CTRON
	MISSION	SSOT	æ	 <del>-</del> Ь	1 0		•	) ·	 				Y BLE
N	Mai	DAMAGE	ε	 785			10,1	}			<u></u>		ILIAR
PPPPC	SYSTEM	SSOI	(9)	 Σ	<del></del>		=		 <del></del>				
8	NNBI	YAUCNI	(2)					CONTACTS	 				(cont'd).
	PERSONNEL	FIAES	(4)			7	\ ¢ \	ું કુ					
	HAZARDOUS- FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	¶ 784 [	¥	TIME	X629X	めと				•	PIGUNE 2
		(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)		Ac/Ac CONTROL			·					··
	ITEM	NO.	3					· · · · · · · · · · · · · · · · · · ·					

133 (A-117)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

UNIT 2

TABLE: NAME:

(Sub-system) AUXILIARY ELECTRONICS BOX

620301 DMG. NO./REV.1

1 of 8 Page

958				
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	Ty Electrolite box, unit 2, contains the D.C. power supplies for 1-20 volte [923], and 4-28 folte [924]. This box is a secured to the inner This box is a bollower with air flow defectors, elapsed he AX power is a ppilled to line 2 through the scope of its case. A tisse transitions from haring the leads—up-bisp by circulity and GRT. Affect This fam is a sifety interlocked via a wind wincity detector so that grower supplies before AC power is applied to the LSO console main year AC power events are indicated an incanfescent amps found on the relay of console.  **X*********************************
HAZARD		YTT.TIBABORY	(12)	setrolics Box, Unit 2, contains the D.C. power Jits (PS2) +20 volts (PS3), and +28 folts (PS unil). The Auxiliary Electronics Box a secure box also contains a blower with air flow de the power is applied to Unit 2 through the tip of the property of the p
1		TIMOTTICZĄD ZVZI ORAŻAH)	(11)	The Box, Unit 2, contains the D.C. power PS2) +20 volts (PS3), and +28 volts (PS3), and +28 volts (PS3), also contains a blower with air flow de also contains a blower with the top of from harming the Heads-Up-Disp ay circles a so afety interlocked via a wind versite before AC power is applied to the revents are indicated on incamescent.
FAILURE	371	EATCTAR SE YE ROTARIGO	(10)	y Electrolics Box, Unit 2, contains the D 20 vults (FS2) +20 volts (FS3), hnd +28 p's hull. The Auxi fary Electronics Box This box also contains a blower with air ansitions from harning the Heads-Up-Disp This fan is also sefery interlocked vis power supplies before AC power is applie and AC powns events are indicated on incan 0 console.  x x x II
	MISSION	POTENTIAL LOSS	(6)	ox, Unit 2, +20 volts Auxi lary contins a ppild to the barming to before AC nts are int
	MIS	SSOI	(8)	Auxi. 1 Auxi.
EFFECT ON:	SYSTEM	DAMAGE	(2)	willery Electrolics Box, 981), -20 volts (PS2) +22 he ship's hull. The Aux ship This box also confort transitions from his fan. This fan is a so pating power wills be pating power wills be the ISO console.  - x
FFEC		SSOI	(9)	ry Electro -20 volts ip's bull. This box he AC power su yed AC power SO console x -
<u>ы</u>	PERSONNET	XAUCNI	(2)	ry El -20 v -20 v This post yed no
	Saad	TIAES	(4)	stilia bhe sh anip. J'fan J'fan I dele the I
HAZARDOUS.	FUNCTIONAL	FAILURE MODR (HAZARD RELEASE MECHANISM)	(3)	provide +5 volts (PS1), -20 volts (PS3), small room inside the skip's hull. The Auxiliary Electron outside skin of the ship's hull. The Auxiliary Electron outside skin of the ship. This box also contains a blower and a circuit break transitions from harding the Heads the assembly cooling fan. This fan is a so sefety interloc cool its heat dissipating power supple before AC power to mitial and delayed AC power events are indicated inside the ISO console.  a) Loss of DC  by a fall-  which cor- relate with  a lack of power supply  A-C input  power supply  power supply  A-C input  power supply  powe
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Auxillary Electronics Box Refer to Figure 1. The Auxillatur the LSO console. The D.C. supplies provide +5 volts (951), located below the LSO platform in a small known inside the sh surface of this room. This is the outside skin of the ship time seter, plot light indicators and a circuit breaker. I delay relay within the assembly prevents rapid on/off power the delay period, AC is applied to the assembly cooling fan airflow must exist within Unit 2 to cool its heat dissipating power bus and console dehumidificat on. The initial and delay chassis within Unit 2 and assembly Mich located inside the lass of power supply outpears and assembly and assembly a loss of power supply outpears and assembly label of power supply which correlate with a lack of power supply a failthear and assembly label between linked time delayed components within Unit 2 and assembly label bonents are, in
	ITEM	О	ε	e i

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Introspible)

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# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 2 TABLE

(Sub-system) AUXILIARY BLECTRONICX BOX NAME:

DMG. NO./REV.: 620381

Page 2 of 8

NOTEGIGORGE MARK	HAZARDOUS-		ă	EPFECT ON:	Š			FAILURE	۱	HAZARD	
ITEM DESCRIPTION	FUNCTIONAL	PERSONNEI	NNE	SYSTEM	ž į	MISSION		23 212	(T NO:	30 20	COMMENTS: RECOMMENDATIONS:
	FAILURE MODE (HAZARD RELEASE MECHANISM)	TIAES	INJUKI	SSOT	DAMAGE	SSOI	POTENTIAL ROSS	EATCETTG YE TOTAREGO	TROTTICZAJO SVZI OMAZAH)	YTLITEABORY DVGWWDXXX	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)
(2)	(3)	3	(2)	(9)	(7)	(8)	(6)	(10)	(11)	(12)	(13)
(cont'd)	their se- quence of turn-on, Ki the Time			<del></del> ,-,,	<del></del>		<del></del>				6 visual) to warn the user that an excursion has occurred which
	Massis fan Ghassis fan Elow Geteutor Geteutor					<del></del>					that requires the attention of maint- enance personnel,  (2) Provide individual
	control relay K2, and circuit breaker C81 11) loss of power sup- ply output caused by			<del></del>	<del></del>	<del></del>		<del></del>			150 console for each voltage as a confidence indicator ("GO"/"NO-GO"),  (3) Provide overvoltage protection for each power supply output
	internal component fallure within the individual power sup-						<del></del>				to har against damaging transfents,  (4) Replace the dependency of the main power control bus on the airflow switch - let loss of cooling airflow
	b) Out-of-Spec Fower Supply Output, 1) Over- voltage condition	ı	×	· .	1	1	×	t	<b>:</b>	u	energize a warning indicator which coordinates with items (1) and (2), above.

NOTE: Hizard Lovel, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; III-Marginal; IV-Wajligible)
Hizard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Memote; E-Extromely Improbable;
F-Incressible;

€

3 0

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

**80** FABLE:

UNIT

(Sub-system) AUXILIARY ELECTRONICS NAME:

620381 DMG. NO./REV. :

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) (13) . (17) SCOOLEGE/ACE - HAZARD TO YILLIEVSON (HAZARO DEVELO (11) FAILURE DETECTABLE
YE
SHOTARE (10) LOSS POTENTIAL MISSION 6 8 SSOI SYSTEM 3 EFFECT ON DAMAGE (9) SSOT BRESONNEI (2) XXCCNI 3 **TIAE2** HAZARDOUS-FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM) unction at Non-regulaply output supply out put caused sing lines and sensing Under volby interna voltage an power supnector of voltage (8+, 8-), caused by immediate tage conted power lines at (V+, V-) terminal shorted pensing failure JI conpower supply. vithin. dition board, lines lines (3) 111) = ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION) 3 (cont 'd) Ξ ITEM ₹. 1.0

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazari Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Freepeart; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impressible)

NOTE

W. Warner

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# VEALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 2 TABLE

(Sub-eystem) AUXILIARY ELECTRONICS BOX

NAME:

620381 DMG. NO./REV.1

(Last page of Unit 2) e yo

	_		_	NAEC-71-7736	
	COMMENTS - RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)		1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) 5.4.3.2 (A-Frirpuent; B-Reasonably Probable; C-Occasional; D-Ramote; B-Extremely Improbable;
HAZARD		YTLTIEAEOFF EMENNICCO	(13)	v	(I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) 4.3.2 (A-Frøykent; B-Reusonably Probable; C-Occasional; D-
1	(Z)	ITADITICZAID SV31 OYASAH)	(11)		1; IV-No C-Occas
FAILURE		DETECTAB BY OPERATOR	(10)	•	-Margina robable;
	MISSION	POTENTIAL LOSS	(6)	×	11 tq
	MIS	SSOI	(8)	<b>-</b>	itica
S S	SYSTEM	DYWYCE	(1)	1	
EPFECT	Ĺ	SSOT	(9)	1	strophic; II-A A-Pruyuent; B
94	PERSONNET	XXOCNI	(2)		astro (A-Pro
	PERS	SZAIT	3	. 1	1.Cat.
O DO GO A B A H	FUNCTIONAL	FAILURB MODE (HAZARD RELEASE MECHANISM)	(6)	c) No A-C poser trans- mission to Synchro Junction Box (Unit 4A2).  1) No poser transmis- alon to Unit 4A2 caused by failure of time delayed events des- cribed in item a)i), above, failure of control valay K2 vithin Unit 2.	5.4.3. para.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont ' d)	Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3 Hazard Probability, Column 12, per MIL-STD-882A, para.
	ITEM	Š.	ε	0 -	NOTE: 1827

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Page 1 of 11

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A1

NAME: (Sub-system) THE RETRACTABLE PEDESTAL ASS'Y

DMG. NO./REV.1

58				
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			SCONNECTIONS   1440 V, 30 POUCA   150 CONNECTIONS   150 CONNECTI
HAZARD		YTLIIAA2019 Dissississississississississississississ	(12)	LIFTING UNIT CABLE INTERCONNECTIONS LIKE IMAGE SONTON LIMIT MAN AND SONTON ON THE PROPERTY OF THE PROPERTY ON
1		inaditisaald Eval Grasah)	Ē	1 NOO 0.18 O NO
FAILURE		EATCETAG BY GOTAREGO	(10)	
	ION	POTENTIAL LOSS	(6)	
	MISSION	SSOT	(8)	Man of the state o
NO.	SYSTEM	DAMAGE	(1)	METAL MARKET TO THE PARTY THROUGH THE PARTY THROUGH THE PARTY THROUGH
EFFECT	SYS	SSOI	(9)	
<u> </u>	PERSONNET	YAUCNI	(2)	
	PERS	FIAEŻ	€	
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	ument, The Improved LSO (Landing it Station for CNNX class Ships," he description of the equipment is be description of the equipment is a pedestal subays can is a hydraulic to provides for raised deployment and of the display console. The lift is nivorcable cylinder assembly capable be to accommodate an Atlantic or form installation. Atop the nsole storage enclosure with a clost interlocks are provided in the nsole storage enclosure with a closure. The lift being down. The lift being a down. The lift being in the console when it is not the console when it is a storage enclosure. The motor of the console when it is a storage enclosure. The motor loperate the cylinder assembly will the storage enclosure. The motor loperate the cylinder assembly will be storage enclosure. The motor loperate the cylinder assembly will be storage enclosure. The motor local controls of the components. The hydraulic cylinder assembly will be provided for three minutes hefore it automatically shuts it local controls of the motor will be added remote confole for operating will be made to raise the lift hydraulics or power failure."  The storage confole for three minutes and their we use this information instead of which is not available.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	From the USNAEC document, "An Improved LSO (Landing signal Officer) Work Station for CWN Class Ships," I December 1977, the description of the equipment is as follows:  "The retractable pedestal subsystem is a hydraulic lifting system that provides for raised deployment and retracted stowage of the display comsole. The lift is a double acting, non-rotable cylinder assembly capable of 75-inch stroke to accommodate an Atlantic or Pacific Theat platform installation. Atop the cylinder is the console storage enclosure with a hinged lid. Electrical interlocks are provided in the lift control system to guard againt the lift being raised with the alid down. The interface between the rod of the cylinder assembly and the display console is a two-axis panning head for orienting the console. The panning head contains electrical interlocks to prevent retraction of the console when it is misaligned with the storage enclosure. The motor paper plant will operate the cylinder assembly will be capable of forcing a full strok in approximately 50 seconds. Integral to the motor purp intimit will be capable of forcing a full strok in approximately 50 seconds. Integral to the motor purp integral controls of the motor controller, zero leakage directional control valves, and all other hydraulic circuit components. The motor controller will provide or three minutes of motor operation before it autom title in the event of a hydraulics or power failure.  The Plate, Information dwg. 51893-1 (see copy at right) shows the individual units/ubunits and their interconnections. We use this information instead of the drawing tree, which is not available.
	ITEM	NO.	ε	1.0

lazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Neyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Impressible) MOTE

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7954

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Page

TABLE, UNIT 3A1

NAMB: (Sub-system) THE RETRACTABLE PEDESTAL

DMG. NO./REV.1

				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	NO.
HAZARD	30	PROBABILITY CCCHRENCE	(13)	ASTAIL AND CONTROL OF THE PROPERTY OF THE PROP
		evottissad Eval (evane)	(11)	
PAILURE	ĺ	EATSCTAE EX FOTARSTO	(01)	
	MISSION	POTENTIAL SECI	(6)	
	MIS	SSOI	(8)	
NO F	BYSTEM	DYMYCE	(7)	
EPFECT		5501	(9)	
	PERSONNET	MUCNI	(5)	
	PER	TIAER	3	
Sinyddaean	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	**************************************
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FURCTION)		(3)	PEDESTAL ASSEMBLY (Unit 3A1), dog. 620740-1, composed of "non-rotating cylinder/platon" attached to the buikhead according to "MUD CYLINDER INSTALLATION," dog. CYLINDER INSTALLATION," dog. 620728-1, serves to lift or retract the Heads-Up-Display (HUD) Console The Up/Down movements are enabled by the hydraulic liquid being larroduced on one side of the non-rotating piston in the cylinder and relieved from its other side. The ends of these movements are controlled by the two LIMIT SWITCHES, 1.51 and 1.52.  See sketch at right.
	ITEM	NO.	ε	1.1.0

Hazard fow.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nestingible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; E-Reasonably Probable; C-Occasional; IP-Remote; E-Extrumely Improbable;
F-Impressible; NOTE

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(FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A1 TABLE

(Sub-system) THE RETRACTABLE PEDESTAL NAME:

DMG. NO./REV.

5 <u>8</u>				·
	SHOTTENBRIDGE STRUMBER	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	
HAZARD		PROBABILITY	(12)	
1	10 E	Trofficaad Tvai Graarii)	(11)	
FAILURE	37	EXTOSTEC BY ROTARSTO	(10)	
	MISSION	POTENTIAL LOSS	(6)	
	MIS	SSOT	(8)	
NO.	SYSTEM	DAMAGE	(7)	
EFFECT ON:	SYS	SSOI	(9)	
	PERSONNET	YMOLNI	(2)	
	PEPS	TIAES	(4)	
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(E)	Cylinder support the not a part of the LGO-HUD SYSTEM therefore, no analysis provided.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	SUPPORT, CYLINDER, misc. dwg. No. OMO76, provides the attachment of the Hydraulio Cylinder to the Bulkhead.
	ITEM	ě	(1)	Ti
				140 (A-124)

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Improbable; P-Improbable; P-Improba

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

Sec. (12.14 Sec.

TABLE: UNIT 3A1

NAME: (Sub-system) THE RETRACTABLE PEDESTAL

DMG. NO./RBV.:

Page d of 11

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				NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:		(13)	The state of the s
HAZARD		PROBABILITY CCUPBERIC	(13)	
•		TINOTHICZALD SVS.I GRASARI)	(11)	
FAILURE		EATSCTAE BY TOTAREGO	(10)	
	MISSION	POTENTIAL POTENTIAL	(6)	
	MISS	SSOI	(8)	
S S	SYSTEM	DYMYCE	(1)	
EFFECT ON	SXS	SSOT	(9)	
183	PERSONNET	MUCNI	(2)	
	PERSC	TIAES	3	
SINCOGRA	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	CYLINDER, day. 620728-4 (Gallano Henning Mopak, Inc. day: D-41785K) is the assembly of the Hydraulic Cylinder with its Piston that is attached to the SUPPORT, and provides foor the lifting and retracting of the Hub Console, which is attached by its Panning Head to the Cuper end of the Piston's Panning Head Adapter.  See sketch at right.
	ITEM	ġ	(1)	1.1.2

NOTE: Hazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible;

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD 0 LSO-MUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: CHIT JAIL HABLE PEDESTAL (SVD-SYSTEM) THE RETRACTABLE PEDESTAL

UNIT 3A1

NAME: (SVD-6ystem)
DWG. NO./REV.:

Page 5 of 11

58						•
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)		(13)	e RECOMENDATION: Acrange with the vendor (Galland Henning Hopek, Inc. 1025 S. 4th St., Milwaukee, Wisc. 53215) to provide round and smooth corners and edges to avoid personal injury, on their dwg. C-22026CY.	RECOMMENDATION: Arrange with the vendor to provide ample Radil to form round fillets between the attaching feet and the body of this part:	e RECOMMENDATION: Arrange with the vendor to incorporate an air purging or other means to get rid of the upper air bubble, to assure the gland to be always bathed in the hydraulic liquid.
HAZARD	10	TTLLIEAGORY DIGINIUDO	(12)	v	•	<b>a</b>
1	<b>10</b>	TACTTICZĄD ZVZI GRAZANI)	(11)	H	1	111
PAILURE	371 371	DETECTAE BY OPERATOR	(10)	<b>5</b>	^	3
	MISSION	POTENTIAL POTENTIAL	(6)		×	
	MIS	SSOI	(8)	<del>-</del>	H	
ON	SYSTEM	DAMAGE	(1)		×	×
BFFECT ON:		SSOI	(9)			
18	PERSONNEL	YMUCKI	(2)	×	н	
	PERSC	SZAIT	€			
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Possibility of injury by the sharp corners.	b) Possibility of cracks from the stress concentration in the two corners for lack of round fillet.	o) Possibility of entrapped air in the Hydrau-lio System, due to the lack of air purging just below the Gland (see sketch at left)
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	ROD HEAD WELLMER, teem No. 1 of the CTLINDER, vendor's dwg. D-41785K, serves as the upper attachment of the CYLINDER to its SUPPORT, and also provides a hydraulic closure at the upper end of the CYLINDER.			
	ITEM		(1)	1.1.2.1		

NOTE

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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NAEC-91-7958

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UNIT 3A1 TABLE: THE RETRACTABLE PEDESTAL (Sub-system)

NAME:

DMG. NO./REV.1

COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS) COMMENTS; RECOMMENDATIONS; • RECOMMENDATION: Arrange with THE PLEE IS DESCRIBER A STATE SAME OF THE and to premachine the Round especially those that could Manager State Nopak, Inc.) to specify ample Radii in all fillets, cause stress concentration, Stock to prepare it better tubing. See sketch below perpendicular hole first RECOMMENDATION: Arrange the vendor to drill the for the welding to the with the vendor (G.H. See sketch: (end of this page). and the axial hole second. **EXPLANATION** - HAZARD ۵ ۵ PROBABILITY HAZARO LEVEL) (11) III 111 FAILURE DETECTABLY BY OPERATOR? 95 ş £ POTENTIAL LOSS MISSION 3 × SSOI 9 EFFECT ON: SYSTEM C DYWYCE × × 9 SSOI ERSONNET 8 3 KAUCHI Ξ TIMES in the Tubing next FAILURE MODE (HAZARD RELEASE Tubing next to equal cross weld or in the sections of to the wold Possibility of 4) Grossly un-Radius apsburrs created the fillst contamination cracks in the the weld, due of the hydraulic fluid by by the intersacting drilpieces to Lack of a cified in ling of the FUNCTIONAL air purying MECHANISM) the two Danger of weld. hole (8). 3 = 3 7 on its CD and attachment of PISTON The pressure of the hydraulic flut and the BEARING SLIDE will prevent on its lower OD and BEARING SLIDE connected to the pressure relief, C-22024CY, provides the attach-ment for the PANNING HEAD at its down when the other side will be upper and and the smooth surface will move this Piston Rod up or CYLINDER 620728-4, vendor's dwg. (COMPONENT, MODB OF OPERATION, FUNCTION) ITEM DESCRIPTION at its lower end, inside. PISTON BOD, item 4 of the its rotation. 1.1.2.2 ITEM  $\Xi$ Š

Hazard Lavel, Column 11, per MIC-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, pur MIC-STD-802A, para. 5.4.3.2 (A-Frequent: B-Resociably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impossible)

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NAEC-91-7958

(FALLURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD 0 LSO-MUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 3A1

(Sub-system) THE RETRACTABLE PEDESTAL

DMG. NO./REV.

NAME:

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58				
3	SNOTTEGNAMMODE STNAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	COMMENT: This part will be stretched, perhaps even in abocks, by the STOP TUBE hitting the upper ROD HEAD at the end of the lifting stroke, if that would not be dampened. That could cause cracks and eventual flaking of the chrome plating.  See our RECOMMENDATION in the item 1:1.2.4, next page.
HAZARD	æ	PROBABILITY IONERRIUCO	(113)	
		ITADITIEZA.D EVEI GRASAH)	(11)	
FAILURE	37	EATTECTAB BY ROTAREGO	(10)	
	MISSION	FOZZ FOZZ	(6)	
	MISS	SSOI	(8)	·
NO.	SYSTEM	DAMAGE	(1)	
EFFECT		SSOI	(9)	
<b>M</b>	PERSONNE	XXUCNI	(2)	
	PERS	LIVES	3	
	FUNCTIONAL	FAILURE MODE .(HAZARD RELEASE MECHANISM)	(3)	No safety problem found originating in/from this part.
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	TUBE WELDHENT, item 13 of the CYLINGER 620728-4, vendor's dwg. C-22025CY, provides the connection between the lower and upper Heads-Attachments to the SUPPORT, and forms the cylinder, in which slides the PISTON. The inside of this carbon steel material (C1026) is electro-Nickel plated (0.002 Cu, 0.00IN <sub>1</sub> ) and chrome-plated (0.0025cr).	
ITEM NO.		ε	1.1.2.3	

Mazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Rensonably Probable; C-Accasional; P-Renote; E-Extremely Improbable;
F-Ingvessible) NOTE

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144 (A-128)

# STAILURE MODES & FFEECIS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A1 TABLE:

(Sub-system) THE RETRACTABLE PEDESTAL NAMB:

DMG. NO./REV.:

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	_	<del></del>		NAEC-91-7958	_
	COMMENDATE RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	the vendor to provide an assured "soft touch" for the upper limit of the stroke, and the hydraulic pressure release under the Piston at reaching the upper limit of the stroke, derived from the movement of the Piston.	
IINZARD		TLLIEAEOR¶	(12)	O	į
١.	52.3	TYNOTTIESAD SVSI GRASAH)	(11)		
PAILURE	371 371	ETECTAE BY OPERATOR	(01)	9 9 X	
	ION	POTENTIAL POTENTIAL	(6)	X	
	MISSION	SSOT	(8)		
ā	тен	DYMYCE	(3)	н	
PPECT	EFFECT ON:	SSOT	(9)		
<u>a</u>	PERCONNET	YMUCHI	(2)		_
	PRREC	SZAIT	3		
on our and	FUNCTIONAL	FAILURE MODR (HAZARD RELEASE MECHANISM)	(3)	Possible "hard" stop when the STOP TUBE "hits" the ROD HEAD, particularly with the hydraulic liquid above the piston missing.  This could result in cracks and pesling tho Chrome plating of the TUBE (cylinder).	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	STOP TUBE, item 15 of the CYLINDER 620728-4, vendor's dwg. A.2020CK, serves as a stop for the uplift; its upper face will get in contact with the lower face of the ROD HEAD WELDMENT.	
	ITEM	O	(3)	1.1.2.4	_

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Francent; 8-Kansymably Probable; C-Occasional; D-Ranote; E-Extremely Improbable;
F-Impressible)

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# (FAILURE MODES & FEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-UUD CONSOLE SYSTEM

TABLE: UNIT 3A1

NAMB:

(Sub-system) THE RETRACTABLE PEDESTAL

DMG. NO./REV.:

MAEC-91-7958

<u> </u>				<del></del>		
	COMMENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	• RECOMMENDATION: Arrange with the vendor to provide round/smooth corners and edges that can be expected to be handled/ touched by the Navy personnel.	• RECOMMENDATION: Arrange with the vendor to specify Radii for the important fillets! See sketch:	Muddle Je
HAZARD		PROBABILLITY CCURRENCE	(12)	U	۵	THE PARTY OF THE P
•		TINOTTICATO TVAI GRASAH)	(11)	11	II	
FAILURE	37	DETECTAB BY OPERATOR	(10)	© 0	<b>£</b>	
	TON	POTENTIAL POSS	(6)		×	
	MISSION	SSOT	(8)			
No.	TEM	DAMAGE	(1)		×	
EFFECT ON:	PERSONNEL SYSTEM	SSOI	(9)	-		
1 22		XHUCNI	(2)	ж		
	PERSO	TIAES	€			
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Possibility of fujury by the sharp corners of the PlATE.	b) Possible crack due to stress concentration in the sharp fillet (no Radius speci- fied, even though it is	drawn as round).
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	BLIND HEAD WELLMENT & ROD, item 21 of the CYLINDER 620786-4, vendor's day. C-22022CV, serves as the lower attachent to the SUPPORT and the ROD serves as the non-rotating base for the PISTON movements.		
	ITBM	0	(1)	1.1.2.5		
		_				

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Level, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable;
F-Impossible)

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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TABLE: UNIT 3A1

NAME: (Sub-system) THE RETRACTABLE PEDESTAL

DMG. NO./REV.:

		·						NAEC-91-7958
	SNOTT-SUCCESSION STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Periodic/frequent inspection and maintenance drills will diminish greatly the probability of this problem to develop.	◆ RECOMMENDATION:		ii) Provide a protection arrangement to keep the debris from falling between the Roller and the Cam.	
HAZARD		YTILIEA80A9 EDMEMAUDDO	(11)	ပ	٩			
1		ITAOTTIOZALD ZVZI OZAZAH)	(11)	H	11			
FAILURE	27 371	EATCETEC YE ROTAREGO	(10)	<b>3</b> ⊕ ⊁	X.			
	ION	POTENTIAL POTENTIAL	(6)	×	×			
	MISSION	SSOI	(8)					
NS NS	SYSTEM	DAMAGE	(1)		×			
EFFECT ON:	SYS	SSOT	(9)					
ធ	NNBI	XXULNI	(2)					
	PERCONNEL	SZAIT	(4)					
SINCOGRA	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Possibility of misadjustment due to accumulated debris interfering between the came and the Roller of the Switch.	b) Possible danger	to constitute in the Limit Switch's Arm due to forced overtravel beyond the 45°	(interfering debtis between the Roller and the Cam).	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	LIMIT SWITCH, dwg. 620728-5, provided by MICHO SWITCH, their dwg. 348Nll-6 (CW). Two of these switches are used, LSl and LS2 for the lower and upper end of the Piston strokes, limiting the lift and retraction of the Retractable Pedestal.  See aketches below:			1777	
	ITEM NO.			1.1.3				

lizzard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
lazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 'A-Fruquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely improbable;
P-Improvable; HOTE

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

TABLE: UNIT 3A1

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C. THE RETRACTABLE PEDESTAL

NAME: (Sub-aystem) TI DMG. NO./REV.:

NAEC-91-7958

58	В						
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)		(13)	• RECOMMENDATION: Provide the two existing rubber inner pads 518987-2 to "overhang" the length of the Half Clamps: also, provide a 45° chamfer or round the inner edges of the Half Clamps.			
HAZARD	30	PROBABILITY DMESSED	(11)	U			
1	(7)	TEXTITIZAED EVEL GEASAH)	(11)	Ħ			
FAILURE	3.1	EATCTTAG BY ROTARGEO	(10)				
	MISSION	POTENTIAL POTENTIAL	(6)	×			
	MIS	SSOI	(8)				
S S	SYSTEM	<b>EDAMA</b> CE	(1)	×			
EFFECT	L	SSOI	(9)				
₩ W	PERSONNET	YAULNI	(2)	H			
	PERS	LIVES	€				
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Possible danger of the insulation of some of the electrical cables to be cut through by the sharp edges of the HTC CLAMPS 620757-1 and 620757-1 and enaulng electrical shocks.			
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	CABLE CLAMP ASSEMBLY 518987-1 provides the support of all electrical cables leading to the HUD Console.			
	ITEM NO.		(1)	1.1.4			
				148 (A-132)			

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IP-Remote; B-Extremely Improbable;
F-Introsible;

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# TRAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

A CONTRACTOR OF THE PARTY OF TH

NAEC-91-7958

TABLE: UNIT 342

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

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W. The RECOURTING PARTIES AND THE PROPERTY OF					NAEC-91-7958
11.20 OPENATION: PULCTION: PERSONNEL STEEN HISSION ENTRY IONIC OPENATION: PULCTION: PU		RECOMMENDATIONS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	
11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.2 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  11.3 OPERATION, FULLCTION PRINCED LEVEL ON INCOME.  12.4 OPERATION PRINCED LEVEL ON INCOME.  13.4 OPERATION PRINCED LEVEL ON INCOME.  14.4 OPERATION PRINCED LEVEL ON INCOME.  15.5 OPERATION PRINCED LEVEL ON INCOME.  15.6 OPERATION PRINCED LEVEL ON INCOME.  16.6 OPERATION PRINCED LEVEL ON INCOME.  1	AZARD			(12)	
13.0 OPERATION, PUNCTION)  13.0 OPERATION, PUNCTION)  13.0 OPERATION, PUNCTION)  13.0 OPERATION, PUNCTION)  14.1 (3) (4) (5) (6) (7) (10)  15.0 OPERATION, PUNCTION)  15.0 OPERATION, PUNCTION)  16.0 OPERATION, PUNCTION)  16.1 (5) (6) (7) (10)  16.2 OPERATION  16.2 OPERATION  16.3 OPERATION  16.4 (5) (6) (1) (10)  16.5 OPERATION  16.5	•			(11)	
17EM ITEM DESCRIPTION (COMPONENT, HODE OF PUNCTIONAL PERSONNEL SYSTEM MISSION (COMPONENT, HODE OF PUNCTIONAL PERSONNEL SYSTEM MISSION (COMPONENT, HODE OF PUNCTIONAL	FAILL		. BY	(10)	
HAZARDOUS- NO. OPERATION, FUNCTION)  1.2.0 FAILURE MODE OPERATION, FUNCTION)  1.2.1 FAILURE MODE OPERATION, FUNCTION)  1.2.2 FAILURE MODE OPERATION, FUNCTION)  1.2.4 FAILURE MODE OPERATION, FUNCTION)  1.2.5 FAILURE MODE OPERATION, FUNCTION)  1.2.6 FAILURE MODE OPERATION, FUNCTION)  1.2.6 FAILURE MODE OPERATION, FUNCTION  1.2.6 FAILURE MODE OPERATION, FUNCTION)  1.2.6 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.6 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION, FUNCTION  1.2.7 FAILURE MODE OPERATION  1.3.7 FAILURE MODE OPERATION  1.4.1 [5] [6] [7]  1.4.1 [5] [6] [7]  1.5.2 FAILURE MODE OPERATION  1.4.2 FAILURE MODE OPERATION  1.4.2 FAILURE MODE OPERATION  1.4.3 FAILURE MODE OPERATION  1.4.4 FAILURE MODE OPERATION  1.4.4 FAILURE OPERATION  1.4 FAILUR		SION	POTENTIAL SSOJ	(6)	
11.2.0 GPERATION, FULCTION)  11.2.0 GPERATION, FULCTION)  11.2.0 GPERATION, FULCTION)  11.2.0 GPERATION, FULCTION)  11.2.0 GPERATION, FULCTION)  12.2 GPECONNEL STATEMENT OF THE HOLE HAS ENGINEE TO SHADOW.  12.3 GPECONNEL STATEMENT OF THE HOLE HAS ENGINEE TO SHADOW.  12.4 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  13.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  14.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  15.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL STATEMENT OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL SCHOOL OF THE HAS ENGINEED TO SHADOW.  16.5 GPECONNEL		MIS	SSOT	€	
HAZARDOUS- HO. OPERATION, FULCTION)  1.2.0 PERCONNEIL  See the Schwartic balow and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.  See the Schwartic Schlemming and attach at right.		STEM	DAMAGE	$\hat{\epsilon}$	
HAZARDOUS- FUNCTIONAL HODE OPERATION, FUNCTION)  HO. OPERATION  HO.	FFEC		ssor	(9)	
11.2.0 INDIANALIC POMER PACKAGE (Unit 18.2)  11.2.0 INDIANALIC POMER PACKAGE (Unit 18.2) day, 620579-1 provides and distributes the hydralic liquid pressure to cause its lift or retraction as needed.  See the Schwartto bolow and akeach at right.  WHENDAMLIC SCHWANIC ALLEGAMIC AND AND AND AND AND AND AND AND AND AND	<u> </u>	ONNE	MUCHI	(5)	
11.2.0 NYDRAULIC POWER PRINCING (HI)  11.2.0 NYDRAULIC POWER PRINCING (Unit 3A2) day provides and distributes the hydratilic to cause its lift or retraction as need See the Schwantic below and sketch at r  Carlo Component (1970)  Carlo Component		PERS		Ξ	
1.2 6 1.1 5 6	SHOUGEBEN	FUNCTIONAL	I LURE ZARD ECHAN	(3)	dwg. 620578-1 alife liquid pressure needed. at right.  C728-1)  C728-1)  C728-1)  C728-1)
		ITEM DESCRIPTION	FUNCTION)	(2)	HYDRAULIC POWER PACKAGE (Unit 3A2) provides and distributes the hydra to cause its lift or retraction as See the Schematic below and aketch See the Schematic below and aketch  LEANTORAULIC SCHEMANIC  ANDRAULIC SCHEMANIC
		ITEM	Š	ε	

NOTE: Hazard Lavel, Column 11, per MIL-SUD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nayligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Frapent; B-Rassonably Probable; C-Occasional; D-Rante; E-Extremely Improbable;
F-Improbable;
F-Improbable;

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM NAEC-91-7958

UNIT 3A2 TABLE: THE HYDRAULIC POWER PACKAGE (Sub-system)

NAME:

DMG. NO./REV.: 620578-1

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COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION HEASURES; SAFETY CONTROLS)  Perfodic checks on the operation of the System will indicate the incipient failures due to leaks. That in combination with the maintenance drills will keep the System in good operating condition.  However, it is always recommended (particularly for the new designs) to place the pump under the tank so that the Pump's suction column will be filled with a positive pressure.  The need for priming will be avoided and the efficiency of the Pump will clancy of the Pump will increase.  RECOMMENDATION: Provide two quesets welded inside the Tank against the outside	
COMMENTS; RECOMMENDS COMPENSATING PROVISION COMPENSATING PROVISION SAFETY CONTROLS SAFETY CONTROLS Indicate the incipient fallures due to leaks. In combination with the tenance drills will keep System in good operating condition.  However, it is always mended (particularly fi the new designs) to pl the pump under the tan so that the Pump's suc column will be filled a positive pressure. The need for priming w be avoided and the eff clency of the Pump will increase.  RECOMMENDATION: Provi gussets welded inside Tank against the outsi gussets & 20579-11.	
D CCURRENCE OF TO CONSTRUCT OF THE CONST	
1 (TEAT) CAVEN E	
TANTARIAN (C) STECTABLE SY OPERATORY STEET	
SSOI © ×	
1	
E DAMAGE SSOI CO	
E SEALL S S	
SE SEALL S	
HAZARDOUS- FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM)  a) Possibility of a discontinuity in the Suction column of the Pump, due to leake. This might present a need for priming, causing a delay in the use of the System getting it to its lifted position.  b) Possibility of crecking of the Air Motor Pump piping due to crecking of the	of Air Hotor/ Pump Assy (que- sets 620579-11 are welded to a large, 3/16 thick plate).
(COMPONENT, MODE OF OPERATION, PUNCTION)  TANK 620579-1 provides not only the storage for the hydraulic liquid, but also serves as a frame hasis for Hydraulic power Package Assembly, which is assembled on top of the fank. This arrangement explains the existence of the two fank Covers on its sides.	
1.2.1 (1)	

NOTE: Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rensonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Infrestable; C-Occasional; D-Remote; B-Extremely Improbable; F-Infrestable; C-Occasional; D-Remote; B-Extremely Improbable; F-Infrestable; C-Occasional; D-Remote; B-Extremely Infrestable; F-Infrestable; B-Extremely Infrestable; B-Extremely Infrestabl

150 (A-134)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-11110 CONSOLE SYSTEM

NAEC-91-7958

UNIT 332 TABLE:

NAME:

THE HYDRAULIC POWER PACKAGE (Sub-system)

DMG. NO./REV.:

620578-1

11 Jo. Page 3

	COMMENDS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	• RECOMMEMBATION: Re-evaluate the filtering arrangement and specify the correct filter element for 620582-6.
HAZARD		PROBABILITY OCCURRENCE	(13)	ပ
1		ITADITIESAID EVEI GEASAH)	(11)	II
FAILURE	21 21	EATTECTAE YE ROTARITO	(10)	<b>e</b> o ×
	NOIS	POTENTIAL POTENTIAL	(6)	
	MISSION	SSOT	(8)	
NO 3	SYSTEM	DAMAGE	(2)	×
EFFECT ON:	L	SSOT	(9)	
M	PERSONNE	YAUCHI	(3)	
	PERS	TIAES	€	
	FUNCTIONAL	FALLURB MODE (HAZARD RELEASE MECHANISM)	(3)	Possible demage- fallure of the Pung due to inadequate filtration of the hydraulic liquid in the suction: the Pung vendor (Vickers) recom- mends 10µ, Note 1F on the Pung dwg. 518893 specifies 518893 specifies by or less, but the Piping Ass'y, dwg. 620582-6 specifies Filter element Vickers F/N 361799, which is 70µ according to vickers' infe, but 149µ according to indexaulic Schematic dwg. 518896.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	PUMP, 518893-1, rated 13GPM at 1200 RPM/8.8HP input, max-operating pressure 1,000 pai, provides the filoud from the Tank to the birectional Control Valve and the lower or upper side of the Hydraulic Cylinder Platon to lift or retract the Heads-Up Display Console.  Two redundant pumps are used, one driven by an Electric Motor, and the other one by an Air Motor.
	ITEM	Ñ.	(1)	1.2.3

151 (A-135)

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HOTE

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; IX-Critical; III-Marginal; IV-Marjigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rousonably Probable; C-Occasional; D-Monote; E-Extremely Improbable;
F-Ingessible)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A2

NAME:

(Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

Page 4 of 14

_			_		
	CAMPAGNET DECOMMENDE ET CAMP	COMPENS ACCORDED TO SECOND SEC	(13)	In a well-maintained System, this situation would not develop. However, we offer:  a RECOMENDATION:  a) Nention in the Operation and Maintenance Manual the need to provide load to the Air Motor or otherwise limit its speed to 10% above that at maximum power.  b) Provide an overspeed governor or shut-off arrangement.	The probability of this situation to develop is very low, because it would require first the failure of the Electric Motor/N.  Pump and then the right condition for freezing the condition for freezing the condensed moisture (PejxP2)!  • RECOMMENDATION: Evaluate the test results and introduce the Corrective Action as necessary.
MAYADO	30	PROBABILITY STRENCE	(15)	۵	
١.	(7	OTTADITEDA D GVAI GRAINEI	(11)	H	
90111100	3.1	DETECTAB BY SOTARSTOR	(10)	•	
	MISSION	POTENTIAL LOSS	(6)	×	х
		SSOI	(8)		
	SYSTEM	DAMAGE	2	×	н
NO BOSSOS	34	SSOI	9		·
•	PERSONNEL	TRUCKI	3		<b>x</b>
	SHERE	LIVES	€		
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) The Air Motor could be driven by the compressed air without a load from the Pump (in case the Pump (in case the Pump (in case the Pump could not suck the H. Fluid from the Tank), in which case the Air Motor could be damaged.	b) The air exhaust could get clog- ged by frozen condensed moisture.
	ITEM DESCRIPTION	OPERATION, FURCTION)	(2)	MOTOR, AIR, dwg. 518913-1, with the Hydraulid Pump connected by the Flexible Coupling form the redundant arrangement to supply the necessary Hydraulid Fluid flow and preseure to the Hydraulid Cylinder, in case the main Hydraulid Pump with its Electric Motor and Flexible Coupling would fail.	
	ITEM		(1)	1.2.3	
				152 (A-136)	

NOTE: Hazard Lewsl, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-IMPRESSIBLE)

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

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UNIT 3A2 TABLE: (Sub-system) THE HYDRAULIC POWER PACKAGE NAME:

DMG. NO./REV.: 620578-1

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			-	NAEC-91-7936	
٠	SHOTFACINGHMOSAG STRAMMOS	COMPENSI NECHERISTING COMPENSIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Periodic inspection and maintenance drills will pravent this failure mode to develop.  The green light Li would not light up, at most, but the System would be functioning.  The green light Li would be "on" as long as the System is "on", but the System is "on", but the System is "on", but the System would be functioning.	astrophic; II-Critical; III-Marginal; IV-Mediagible) (A-Frequent; B-Passonably Probable; C-Occasional; D-Ramots; E-Extremely Improbable;
HAZARD		YTIJIEREORG 3DNERNUDDO	(11)	a N U A	gligible fomals
1	(7	(TENOTTIESALD) EVSI (DYANAH)	(11)		1, IV-Ne C-Occas
FAILURE	37	DETECTAB PY OPERATOR	(01)	2 3 3	-Margina robuble;
	MISSION	POTENTIAL LOSS	(6)	н	Li titi
	MISS	SSOI	(8)		itical
ĕ	SYSTEM	DAMAGE	(2)	к к	2 4 6
RFFECT ON:	L	SSOT	(9)		phic;
24	PERSONNEL	MOCNI	(2)		astro (A-Pr
	PBRS	TIAES	Ξ		1-CE
	PUNCTIONAL	FALLURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Power element leaks - possi- ble contamina- tion of the contacts and of the Junction Box by the H. fluid. b) Power element torn - the Pressure Switch does not func- tion. c) Non-conductive contamination on (one of the) contamination d) A short bet; ween the con- tacts.	92A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) -STD-882A, para. 5.4.3.2 (A-Frenkent; B-Rosenably Frobable; C-Occasional; D-
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	PRESSURE SWITCH, dwg. C403741-27 is a double pole, aingle throw electrical switch, actuated by a push rod from the power element (seamless phosphor broaze bellows) aljusted to close the NO contacts at 20 PSI pressure (increasing) in the Bydraulic Pump outlet. The closure of these contacts will light up the green light Ll "Pump Rusning" on the Panel.	Hazard Level, Column 11, per MIL-STD-862A, para.
	тви	ġ.	ε	1.2.4	NOTE: Ha

153 (A-137)

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Page 6

# (FAILURE MODES & EFFECTS ANALYSIS - SYSIEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE, UNIT 3A2

HAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DHG. HO./REV.: 620578-1

1				
		COMPRESS RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION NEASURES BAPETY CONTROLS)	(13)	No real problem present. The fact that the (eoft) seat will get worn and will leak will be hendled by the maintenance, and the the maintenance, and the the valve will be hardly noticed on the Presence Gage will be of little consequence.
HARARD	4	D TTLILEABORT SUMBBEUDDO	(21)	•
١.	12	TEMET GRAVNI) DIEDZIELESTO	(11)	2
PATTORE	7	OPERATOR?	(01)	<b>\$</b>
	3	POTENTIAL	(8)	
	MIRRION	SSOI	9	
į	3	ZOVERVCE	3	
REPRESENTATION	AVRTEN	\$\$01	9	
		MUCHI	3	
	Peschaler	SEATT	€	
	HASARDOUS-	FUNCTIONAL FAILUR MODE (MALAND RELEASE MECHANISM)	(6)	a) Inner lock b) Blocked closed
	ITEM DESCRIPTION	(COMPONENT, NODE OF OPERATION, PUNCTION)	(2)	value, suur-ort, dag. 434334-1, provides the commection of the Hydraulic Liquid Pressure Cape 620578-2.
	TTEN	ġ.	Œ	1.2.8
				154 (A-138)

NOTE: Mazard Law.1, Column 11, per HIL-STD-862A, pera. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, per HIL-STD-862A, pera. 5.4.3.2 (A-Frequent; B-Ponsonably Probable; C-Cacasional; R-Manote; B-Extramely Inpurchable;
P-Impressible)

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## (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

LE: UNIT 3A2

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

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_				NAEC-91-7958
	SNOITENBERDS STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)	(13)	PROMEMBLYION: Provide filteration of the Hydraulic Fluid to 25 micron or better, as required.  One possible way could be by changing the connection as shown in the following HYDRAULIC schematic:  FROM:  FROM:  Section:  (1) 186 PM.  (1) 18
HAZARD		PROBABILLITY OCCURRENCE	(11)	
1.	, 10 (1)	TENSTATESALD SVS.I OSASABI	(11)	111
FAILURE	37 (3	DETECTAB YE ROTARETOR	(01)	#
	ION	POTENTIAL	6)	×
	MISSION	SSOT	9	
NO.	SYSTEM	DAMAGE	(3)	×
EFFECT ON	L	SSOI	(9)	
🛱	PERSONNEL	KHOCNI	(2)	
	PBPS	TIAES	€	
0110000	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Contamination entering the Relief Valve with the Hydraulid Fluid. the unit requires filtrated to 19 of the dwg.  517792-1), but it receives the H. Fluid filtreceives the H. Fluid filtreceives the micron (according to Hydraulic Schematic S18896).
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	RELIEF VALVE 517792-1, on the Panel above the Pressure gag, anables the adjustment of the operating pressure of the Hydraulic Fluid in the System (200 PSI).
	ITEM	ò	3	1. 2.6
				155 (A-139)

NOTE: Hazard Level, Column 11, per MIL-SND-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible)
Hazard Probability, Column 12, per MIL-SND-882A, para. 5.4.3.2 (A-Frequent: B-Reasonably Probable; C-Oxcasional; O-Remote; E-Extremely Improbable;
F-Impressible;

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(FALLURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A2

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

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	· SNOTERGNAMMODAR · SENAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION HEASURES, SAFETY CONTROLS)	(13)	RECOMMEDATION: Provide a connection (tube) between the vent opening and the top of the Tank, or plug the vent connection in the valve.	
HAZARD		PROBABILITY  SCURBBRICA	(12)	U	
ı		TVOTTICZŁD ZVZI OSANAH)	(11)	II .	
FAILURE	37	DETECTAB YE GOTRAGO	(10)	Y 6 8	
	MISSION	POTENTIAL POSS	(6)	*	
	MIS	ross	(8)		
EFFECT ON	SYSTEM	DYWYCE	(2)	×	
FFEC	L	SSOI	છ		
M	PEPSONNET	ENJOEKI	(2)		
	PRPS	SZAIT	3		
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	b) Contamination, entering the Relief Valve through its open Vent opening.	
	ITEM DESCRIPTION	OPERATION, PURCTION)	(2)	(cont'd) RELIEF VALVE	
	ITEM	Š	(1)	156 (A-140)	

NOTE: Nazard Loval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Nazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IP-Remote; B-Extremely Improbable;
F-Improbable;

156 (A-140)

## (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

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Page

UNIT 3A2 FABLE: THE HYDRAULIC POWER PACKAGE (Sub-aystem) NAME

620578-1 DWG. NO./REV.:

COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS) situation will be always present any time the HUD Azimuth and/or activating the HUD-Down switch(es Elevation will not be in "correct For that, we present the followposition, and the LS2 return of Azimuth and Elevation to their aligned positions upon COMMENTS; RECOMMENDATIONS; moving down, or keep the L82-B connections in such a way that interlocking, or an automatic Provide the failure of LS2, there is no light L4 warning available! normal position. With this there will be an automatic before the HUD would start contemplated hazardous would fail to return to contacts slways open(i) RECOMMENDATION: (aligned) ingi i CCCURRENCE AMT OF 620500 (V.Y.) - HAZARD a,o PROBABILITY OF THE There should be no connection between pins LS4-2 and LS5-21 For better reliability of the observation light to be "on", (11) ñ (HAZAH) I eliminate the LS1-Bi PAILURE Ĩ DETECTABLE BY OPERATOR? (01) Xes H ì SSOT 6 3 MISSION -3114 COLENTIAL ... 8 SSOI 1884 mere \_ 1984 0 BYSTEM 3 × RFFECT ON DAMAGE 113 NOTES: (9) SSOI 3 ERSONNEL 3 THORK 15 PACE ELECTION SCIENTIC DIACENTA NOTE " SCHENATIC SHOWN WITH Ξ FIAES ¥ HAZARD RELEASE HUD down even if ASKEW", if the normal position (at the 10 inch the HUD would be LS2 Limit Switc (at the 10 inch above the "Box" failing itself, (umop dotub down) Valve, without will send the would fail to FAILURE MODE FUNCTIONAL HAZARDOUS-Control MECHANISM)  $\widehat{\mathbb{S}}$ 189 Ĭ 7 other side of the M. Cylinder to flow back to the Tank "without 518898-1, directs the flow of allows the H. Fluid from the (COMPONENT, MODE OF OPERATION, FUNCTION) pressure, to the Hydraulio retracting of the MD, and the Hydraulic Fluid, under CONTROL VALVE, ITEM DESCRIPTION 12.2 Cylinder for lifting or 1 . 3 DIRECTIONAL pressure."  $\widehat{\Xi}$ 1.2.7 ITEM Š

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.3 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rassambly Probable; C-Occasional; D-Remote; E-Extremely Imperbable; F-Impossible) NOTE:

Water Barrier

157 (A-141)

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A2 TABLE (Sub-system) THE HYDRAULIC POWER PACKAGE

NAME:

620578-1 DMG. NO./REV.

TERM DESCRIPTION   THE DESCRIPTION   THE PROPERTY ON THE PROPERTY ON THE PROPERTY ON THE PROPERTY ON THE PROPERTY ON THE PROPERTY OF THE PRO							<del></del>
TYPEN DESCRIPPION   PUNCTIONAL CONTROL   PUNCTIONAL   PUNCTIONAL CONTROL   PUNCTIONAL   PU		1	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	b)Periodic inspections, checks and maintenance drills will keep this component in good operational condition.		
TTEM DESCRIPTION   TARANDOUS-   PUNCTIONAL	AZARD	20		(13)	60		υ .
ITEM DESCRIPTION   PURCTIONAL PURE SYSTEM HISSION   PURE COMPONENT, WODE OF   PAILURE HODE   PAILURE HORE   PAILURE   PAILURE HORE   PAILURE   PAILURE HORE   PAILURE   PAILURE HORE   PAILURE   PAILUR	1	n N	OTASSITCATIO TEVEL GRASAH)	(11)			=
ITEM DESCRIPTION  (COMPONENT, HODE OF PUNCTIONAL  (COMPONENT, HODE OF PUNCTIONAL  (COMPONENT, HODE OF PAILURE HODE  (COMPONENT, HODE OF PAILURE HODE  (COMPONENT, HODE OF PAILURE HODE  (AAZARD RELEASE  (A) (5) (6) (7) (8)  (A) (A) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B	PAILA	37	DETECTABI BY CARATORI	(10)	<b>8</b>		3
ITEM DESCRIPTION  (COMPONENT, HODE OF PULLY OF PULLY ON THE STATEM OPERATION, FUNCTION)  (COMPONENT, HODE OF PULLY OF PU		SION	POTENTIAL LOSS	(6)			N .
TTEM DESCRIPTION  (COMPONENT, MODE OF COMPONENT, MO			SSOI	(8)			
TTEM DESCRIPTION  (COMPONENT, MODE OF PRINCE HOLE  (COMPONENT, MODE OF PRINCE HOLE  (COMPONENT, MODE OF PRINCE HOLE  (COMPONENT, MODE OF HEREASE NO FELEASE		DAMAGE	(7)			×	
ITEM DESCRIPTION   PERSONNE	FECT	<u>ا</u> ا	<u>.l</u>	(9)			
ITEM DESCRIPTION  (COMPONENT, MODE OF PAILLINE MODE OF PAILLINE MODE OF PAILLINE MODE OF PAILLINE MODE OF PAILLINE MODE OF PAILLINE MODE OF CONTY, MODE OF PAILLINE MODE OF TAXARD RELEASE HECTIONAL CONTROL VALVE by No further hear connections, filters, chected in the normally mainth thair connections, filters, chected for the Hydraulic Power Package.  FILTER ELEMENT 620592-6, for filter anchonic 51665-1, is the Hydraulic Power Package.  FILTER ELEMENT 620592-6, for filter anchonic 51665-1, is the Hydraulic Power Package.  FILTER ELEMENT 620592-6, for filter is in the Hydraulic Power Package.  FILTER ELEMENT 620592-6, for filtering.  This filter is in the Hydraulic Power Package of Possible damage the Vickers Div. of SPERNY RAND).  This filter is in the Hydraulic Power Package of Milter is in the Hydraulic Power Package.  Filtering.	2	NNE	INJURY	(2)			
ITEM DESCRIPTION  (COMPONENT, MODE OF FROME OPERATION, FUNCTION)  (PROPERATION, FUNCTION)  (CONT.d) DIRECTIONAL CONTROL VALYE b)  (CONT.d) DIRECTIONAL CONTROL VALYE b)  PIDING ASSEMBLY 620582-1 shows and specifies the pipes and tubings with their connections, filters, check valves and attaching parts, as needed for the Hydraulic Power Package.  FILTER RIBMENT 620582-6, for tipe Vickers Div. of SPERNY RAND).  This filter is in the Hydraulic Pumps' Suction, good for 149 micron filtration according to 518896.		PERSC	TIAES	3		-	
		HAZARDOUS-	FAILURE WODE (HAZARD RELEASE MECHANISM)	(3)	(q		Possible damage to the H. Pumps due to inedequate filtering.
1.2.7		ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	(cont'd) DIRECTIONAL CONTROL VALVE	PIPING ASSEMBLY 620501-1 shows and appointes the pipes and tubings with their connections, filters, check valves and attaching parts, as needed for the Hydraulic Power Package.	Filter Bibmew 620582-6, for filter anclosure 516965-1, is the Vickers Div. of SPERMY RAND). This filter is in the Hydraulic Pumps' Suction, good for 149 micron filtration according to 518896.
		ITEM	<u> </u>	ε	1.2.7	1.2.0	1.2.0.3

Mazard Lewel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neoligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) NOTE:

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158 (A-142)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-110D CONSOLE SYSTEM

Carried Witness Co. Cappage Co. Service C.

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LE: UNIT 3A2

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

NAEC-91-7958

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Page 11

NAEC-91-7958 COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAPETY CONTROLS) COMMENTS, RECOMMENDATIONS, easy/quick replacement of in this line of filters). 620582-1 (Piping Assy) 6 Filter Blement before opening Power Package). Periodic inspections, checks prevent this failure mode to a) Provide also electrical b) Provide enough room for and maintenance drills will Dirt Alarm (available develop (by replacing the pointer and scale of this Filter on the following, due to the possibility of the human Show the Dirt Alarm (Hydrau) to the Filter Element. assembly drawings: llowever, we present the the by-pass valve). (13) • RECOMMENDATIONS: forgetfulness 620578-1 6 PROBABILITY OF ٥ HAZARD (11) 111 ı (JEVEL ORAZAH) FAILURE DETECTABLE BY CREARTOR? (10) Yes POTENTIAL 6 MISSION × (8) SSOI EFFECT ON: SYSTEM DYWYCE 3 9 SSOI ERSONNET ŝ MUCNI 3 **TIAE**2 open and letting some unfiltered H. Pluid to flow to the Directional (HAZARD RELEASE Possibility of the by-pass valve being NOTE: The visible Dirt Alara pointer FAILURE MODE HAZARDOUS-**FUNCTIONAL** Control Valve. could be over-MECHANISM) 3 provides filtering of the Hydrauli SCHROEDER BROS. CORP DF-30-1CC10) FILTER 518897-1 with its FILTER RIEMENT 424337-1 (possibly Fluid to 10 microns, and has a by-pass valve and the pointer Dirt Alarm. (COMPONENT, MODE OF OPERATION, FUNCTION) ITEM DESCRIPTION 3 1.2.8.2 Ξ ITEM ₹

Hazard Lovel, Column II, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 9-Ressonably Probable; C-Occasional; 17-Remote; E-Extremely Improbable; P-Impossible) NOIE:

To have been

159 (A-143)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM MAEC-91-7958

TABLE: UNIT 3A2

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

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_			,	
		COMPENSING RECOMMENDATIONS COMPENSATING FOOVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	• RECOMMENDATION: Provide a tie between the upper end (the Filter 516965-1) and the Support Prame 620591-1 to eliminate or greatly reduce the vibration of the Filter.
HAZARD	30°	PROBABILLITY  OCCUPRENCE	(12)	<u>a</u>
1	(7	DITADITICZAJD EVAL ORAZAH)	(11)	#
FAILURE	i E	DETECTAB: BY SOTAREOR	(10)	X e e
	MISSION	FOTENTIAL	(6)	н
		SSOT	<b>®</b>	
BFFECT ON:	SYSTEM	DAMAGE	(2)	×
FFEC	SY	SSOI	(9)	
200	PERSONNER	MUCNI	3	
	PERS	TIAES	€	
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Possibility of cracks at the lower end(s) of the tubings, due to induced vibrations— the cracks would produce leaks (air into the H. Pump Suction while the Pump is running, and causing a discont muity in the suction column when the Pump is not running).
	ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	TUBING 620582-5 with the FILTER 516965-1 forms a relatively heavy and extended subassembly, held at two points.  See sketch:
	ITEM	Š.	(1)	1.2.8.3
				160 (A-144)

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Improbability

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

Commence of the Commence of th

TABLE: UNIT 3A2

NAME: (Sub-system) THE HYDRAULIC POWER PACKAGE

DMG. NO./REV.: 620578-1

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					NAEC-91-7958
	SNOTTENDENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	COMMENT: In the Note 5, the aingle its intervals on the Harnesses are specified as 1 (one) inch, and in the wire break-outs even closer intervals. This seems to be too tight! It is believed that 3 to 6 inches could be all-right, and tighter in the wire break-outs.	There is a redundant arrangement: Air Motor + Hydraulic Plump.
HAZARD		YTLLIEAEORG EDMERRUDDO	(11)		a
1	(Z)	TYOTTISZAD ZVZI OZASÁH)	(11)		H
FAILURE	ĺ	EATCETEC YE ROTAREGO	(01)		g \$ >-
	TON	POSENTIAL POSE	(6)		
	MISSION	SSOI	(8)		
NO S	TEM	DAMAGE	Ē		
EFFECT	SYSTEM	SSOI	(9)		
33	NNEL	YAUCNI	(2)		· · · · · · · · · · · · · · · · · · ·
	PERSONNEL	TIAES	3		
		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		No problems ex- pected in a reasonably-cared- for assembly.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	RIECTRICAL INSTALLATION, 620583-1 shows and specifies the electrical connections (cables), as well as it provides the wiring diagram for the hydraulic Power Package 620578-1.	ELECTRICAL MOTOR STARTER, 518910-1 provides the starting/stopping of the Electric Motor/N. Pump. It is equipped with protections (undervoltage, motor overload and pilot circuit, and a timer (set for three minutes - which is ample time, considering the HUD is lifted in about 60 seconds).
	ITEM	ON	3	1.2.9.0	1.2.9.1

Mazard Kavel, Column 11, per MIL-STD-862A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; TV-Negligible)
Mazard Probability, Column 12, per MIL-STD-862A, para. 5.4.3.2 (A-Fraguent; P-Recently Probabie; C-Occasional; D-Rumote; E-Extremely Improbable;
F-Improsible) NOTE

161 (A-145)

# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

HAEC-91-7958

TABLE: UNIT 3A2

NAME:

(Sub-system) THE HYDRAULIC POFFER PACKAGE

DMG. NO./RBV.1 620578-1

Page 14 of 14

95§						
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			(13)	No problem detected that would develop in a normally well-maintained assembly.	The stuffing arrangement (for the two openings of the Junction Box Assembly for the two cables/harnesses, to avoid the damage to the insulation and to keep the Box vater-tight) is specified on interconnecting Cable Diagram 620754.
ļ	HAZARD		PROBABILITY OCCURRENCE	(12)	۵	U .
	t		TROTTICZAJO EVEL GEASAH)	(11)	H	11-111
	FAILURE	27 27	DETECTAE BY OPERATOR	(10)	<b>8</b> 0 A	2
		MISSION	POTENTIAL BOTENTIAL	(6)		н
		MIS	SSOI	(8)		
ļ	NO .:	SYSTEM	DAMAGE	(1)		н
	EFFECT ON		SSOI	(9)		
	<u>M</u>	PERSONNEI	XXOCNI	(2)		×
		PERS	TIAES	€		
		FUNCTIONAL	FALURE MODE (HAZARD RELEASE MECHANISM)	(3)		Possibility of the insulation of the cables to be cut by the edges of the 1.010 and 1.135 dis. openings. Also, the possibility of contamination entering through these openings around the cables (harnesses)
		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION) (1)			ELECTRIC MOTOR, 518694-1, is a 440VAC, 60HE, 3-phase, 10HP at 1160RPH full-load, 14 amp., motor for driving the H. Pump. It has an explosion-proof enclosure and class F insulation.	JUNCTION BOX ASSEMBLY, 518918-1, provides the housing for terminal boards TB1 & TB2 and the entry/exit for the electrical harnesses/cables: 620589-1 (from the Directional Control Valve) and 620589-4 (from the pressure awitch).
		ITEM	NO.	(1)	1.2.9.2	1.2.9.3

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) NOTE

162 (A-146)

#### (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM NAEC-91-7958

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TABLE: UNIT 3A3

NAMB: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.: 620587-1

Page 1 of 15

11.10 OCCUPANTAL PRODUCTION CONTRACTOR OF TAXABLE PRODUCTIONS CONTRACTOR CONT				NAEC-91-7958
1.1.0 COUPLE PARTICUL PRINCE OPERATION, FUNCTIONNE PRECONNET PARTICUS OF FAULTINGS OF STREET ON COUPLE PARTICUS, FUNCTIONNE, F		COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)	(13)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	ZARD		(13)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	1 (	DINOLICEALD LEVEL GRANAH)	(11)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	FAILU	XΕ	(01)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	STON	POTENTIAL SECI	(6)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	ط ہا ا	ssot	(8)	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new		DAMAGE		
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new			$\vdash \dashv$	
ITEM (COMPONENT, MODE OF FUNCTIONAL FUNCTIONAL NO. OPERATION, FUNCTION) FUNCTIONAL NO. OPERATION, FUNCTION) FAILURE MODE OF FAILURE MODE OF FAILURE MODE OF FAILURE ASSENDENT (Unit 343), does not a several Switch-Indicators on the new	SONN	MUCHI	-	
1.3.9 (1) (1) (1) (1)		ATLURE MODE ATLURE MODE ATARD RELEASE MECHANISM)		
1.3.9 (1) (1) (1) (1)	ITEM DESCRIPTION		(2)	CCWTROL PAMEL ASSEMBLY (Unit 3A3), dbg. 620587-1, contains several ferminal Boards (five) inside and several Switch-Indicators on the Display Panel for the remote operating of the Console System. There is also a Display Intensity Transformer.
	ITEM	Ö	(3)	0. C. 163 (A-147)

Hazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (1-Catastrophic; II-Critical; III-Marginal; IV-New; igible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Mcascomably Probable; C-Occasional; D-Remote; E-Extromely Improbable;
F-Improssible;

NAEC-91-795<u>8</u>

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD 0 LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

LE: UNIT 3A3

(Sub-system) CONTROL PANEL ASS'Y

NAME:

DMG. NO./REV.: 620587-1

Page 2 of 15

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS	SAFETY CONTROLS) (13)	No problems expected in a well-maintained System.	SPLASH PROOF INTEGRAL SEAL  Teach to Splanh proof, ML-SID 100, High Short to MR-S NOTC. Sand is Integral to the postblattom. Reserved form of postblattom.
COMMENT COMPEN		No pro	SPLASH PROOF INTEG
	E PROBABIL	۵	iii looo
ISOET)	CANZAH)	111	
TABLE TORS	r   🧧	e 0 >-	WS IN THE
NO TVI	E LOSS		GROWINET SWITCH HOUSING
SEO SEO	7 <b>1</b>		ENTITCH H
	S DAKE		
	71 <u>@</u>		
PERSONNEI E	TUI &		L SPACER L SPACER L SPACER L AMPS  LAMPS
VES P	II E		The Part of the Pa
HAZARDOUS- FUNCTIONAL FAILURE MODR (HAZARD RELEASE	MECHAN ISM)		MOUNTING CAM  MEZEL  SHAFT  ACTUATOR
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)	(3)	VARIABLE TRANSFORMER 516917-1 (V1 on the Electrical Schematic Diagram 5205801, mounted on the Control Panel Ass'y, serves to adjust, manually, the Diaplay Intensity of the lights on the Control Panel.	SWITCH-INDICATOR(s) A620741-X, mounted individually on the Control Panel, are basically the JAY-EL P/N 10648 as shown in the saketches at the right, and serve to switch and indicate by light the various electrical circuits of the System.  Refer to the ELECTRICAL SCHEWATIC DIAGRAM 620580, a reduced copy of which is on the next page.
ITEM NO.	8	1.3.1	1.3.2.

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Ramote; E-Extremely Improbable;
C 1--vssi1-1-1

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164 (A-148)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM MAEC-91-7958

CONTROL PANEL ASS'Y UNIT 3A3 TABLE:

(Sub-system) NAME:

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620587-1 DMG. NO./REV.:

NAEC-91-7958 COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS) (13) ELECTRICAL SCHEMATIC DIAGRAM OCCUBRENCE HAZARD PROBABILITY OF (11) (HAYALI GHAYAH) 1 FAILURE ij **CHOTARES** (10) DETECTABLE BY TOSS FOLENTIAL 6 MISSION 9 ı SSOI ĕ SYSTEM 3 DYMYCE 3 EFFECT (9) SSOI BREONNEL , . 1 3 1 INDOK 3 Ξ TIAES 1 HAZARDOUS-FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM) - 2 3 ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION) (cont'd) SWITCH-INDICATOR (2) 1.3.2 ITEM 3 Š 165 (A-149)

Hazard Lavel, Column 11, per Mil-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per Mil-STD-882A, para. 5.4.3.2 (A-Frequent; B-Poasonably Probable; C-Occasional; D-Nemote; E-Extremely Improbable; F-Impossible) NOTE:

# (EALLURE MODES & FEFECTS ANALYSIS - SYSTEM) SAETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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MAEC-91-7958

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.: 620587-1

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	_	_		_	
		COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION REASURES SAFETY CONTROLS)		(13)	There is no real Safety lazard in this possible "failure mode." However, it would seem reasonable to provide the grounding, using the Switch-Indicators with the Switch-Indicators with the BMI shielding, which the manufacturer can provide.  EM SHRIDING Welded 307 studdens steel grounding where preside densis ground for EM.
	HAZARD	26	PROBABILLITY COCURRENCES	(13)	o Want
	1	E 20	INOTICZŁO ZVZI OSASAH)	(11)	2
	FAILURE	27 271	DETECTAB BY COPRANCO	(10)	3
Ì		ION	FORE FOLLING	(6)	
		MISSION	SSOI	(8)	•
	ð	SYSTEM	SDAMAG	(1)	
	EFFECT	1 _ i	SSOI	(9)	
	藍	PERSONNEL	XXCCNI	(2)	·
		SHE S	TIAES	•	
	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	Possibility of the static electricity discharges between the Push-Button and the Bwitton Bould cause "glitches" on the tast screen or record tape. Some of these could cause a considerable time loss in the Failure verification/analysis effort.	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) SWITCH-INDICATOR A620741-x	
	ITEH NO.			ε	1.3.2.0
					166 (2-150)

NOTE: Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rassonably Probable; C-Occasional; D-Ranote; E-Extremely Improbable;
F-Improssible;

166 (A-150)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM NAEC-91-7958

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.: 620587-1

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					NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)			No problem! There are four lamps, individually wired, which is a good arrangement.  Also, the replacement of the lamp is a simple manner. Can be performed quickly without tools.  No real problem even if it does occur. Periodic checks and maintenance drills will prevent or repair these	Hardly any real problem, even if this failure occurred just before (during?) the actual operation, because the hydraulic pressure will indicate that the Pump is running. (Green light Ll "PUMP RUNNING") NOTE: This light is only for the switch button location
HAZARD		PROBABILITY: OCCUPARMICE	(12)	u a	<u>a</u>
	(T)	TROTTESAD SVSL OHASAR)	(11)	2 2	2
FAILURE	्र द्वा	DETECTAB BY COPERATOR	(01)	g g x	•
	MISSION	POTENTIAL ESSJ	(6)		
	MIS	SSOI	(8)		
NO 1	SYSTEM	DAMAGE	(2)		
EFFECT ON:		SSOI	(9)		
	Personnei	MOCNI	(2)		
_	PERS	TIAER	3		
BIIOGGREEN	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	a) One lamp fails (burns out). b) One lamp fails (its electric connection opened).	o) All four lamps fall (open in the common line).
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUMCTION)		(2)	SWITCH-INDICATOR A620741-1 (15-51) "Pump Start" has an Amber 11ght.	SI PUMP START
	ITEM NO.			1.3.2.1	

NOTE: Mazard Lovel, Column 11, per MIF-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neuligible)
Mizzard Probability, Column 12, per MIF-STD-882A, para. 5.4.3.2 (A-Proxpent; B-Rosconably Probable; C-Occasional; M-Romote; E-Extremely Improbable;
F-Impressible;

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-IND CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.; 620587-1

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					7
COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)			(ET)	There is a redundant arrangement to start the Pump: the local start.  No problems are expected in a vell-maintained/serviced System.  The Pump would scmentarily stop when the PUMP STOP switch would be pressed (16-52), but it would restart immediately upon releasing the finger pressure on the 16-52 switch. In short: the Pump could not be switched off by a normally-provided switch.  However, it could be stopped by the main switch (\$10).  It is expected that the Operation Manual will have the smergency procedures, like the one, properly explained.	
HAZARD		PROBABILLTY CCCURRENCE	(12)	U A	
•	190 190	TPOPIESAD SVSI GRANH)	(11)	E E	
FAILURE	271 271	DETECTAB BY OPERATOR	(10)		1
	MISSION	POTENTIAL	(6)		
	Н	siot	9		
NO E	SYSTEM	DAMAGE	3		$\downarrow$
EFFECT	1 1	SSOI	(9)		-
_	PERSONNET	ENJURY	(3)		-
	PBR	TIAES	3		
0100	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	d) Switch falls (open in the line of con- tacts 7-8) (non-conductive contamination between con- tacts). e) Switch falls (short between contacts 7-8).	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) SHITCH-INDICATOR A620741-1 (L5-51) "POMP START"		
NO.			(1)	1.3.2.1	

Hazard Lawel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Nexilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible)

168 (A-152)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM NAEC-91-7958

TABLE: UNIT:3A3

(Sub-system) CONTROL PANEL ASS'Y

DMG. NO./RBV.: 620587-1

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	_		-				_
COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			(13)	No problem! There are four Lamps, individually wired, which is a good arrangement. Also, the replacement of the Lamp is a simple manner, can be performed quickly without tools.	No real problem even if it does occur. Periodic checks and main- tenance drills will prevent or repair these remote failures.	Hardly any real problem, even if this failure occurred just before (during?) the actual operation, because the hydraulic pressure will indicate that the Fump is running or that it stopped. (Green light Ll "FUMP RUMRING") NOTE: See 1.3.2.1.c., column 13.	
HAZARD		PROBABILITY	(13)	υ	a	<u>a</u>	
,		TYOTTISZAD TVSI (STAINE)	(11)	2	2	2	
FAILURE	27 3731	DETECTAB BY HOTARETOR	(10)	œ *	• • >	•	
	NOIS	POTENTIAL ROSS	(6)				٦
	MISSION	SSOT	(8)				
8	SYSTEM	DAMAGE	(2)				
EFFECT ON		SSOT	9				
	Personnei	MUCHI	3				
	PBRS	FIAES	3	······································	······································		
HAZARDOUS- FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM)		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) One Lamp fails (burns out).	b) One Lamp fails (its electric connection opened).	o) All four Lamps fail (open in the common line).	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	SMITCH-INDICATOR A620741-2 (16-52) "PUNP STOP" has an Amber 11ght.		PUMP STOP		
ITEM NO.			3	13.2.2			

Hazard Level, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neujigible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Progrent; B-Reusonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impressible)

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## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.: 620587-1

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TTEM DESCRIPTION FALLING MANDE OF FALLING MANDE OF FALLING MAND ENTERNORMS.  (CONFIDENTIAL MAND RELEASE FALLING MAND FALLI	58				
HAZANDOUS- PERCONIFION PARTICIONAL PARTICI		COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	
HAZANDUS- WESCRIPTION WESCRIPTION FUNCTIONAL	AZARD	20	PROBABILLTY OCCUPRENCE	(12)	U A
HAZARDOUS- HAZARDOUS- HAZARDOUS- FUNCTIONA FUN	1	(7)	Troffisald Evel Giasah)	(11)	E 2
HAZARDOUS- PUNCTION PUNCTION PUNCTION PUNCTION PRESCRIPTION PRESCRIPTI	FAIL	<b>37</b> 1	DETECTAB BY GOTARIGO	(10)	
HATARDOUS— HATARDOUS— PERFORMED SYSTEM FALLURE HONE TION, FUNCTION) HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARD RELEASE HATARDOUS— H		ION	POSS POTENTIAL	(6)	×
HAZARDOUS- PUNCTIONAL PUNCTIONAL FAILURE HODE FAILURE HOD		MISS	SSOI	<b>®</b>	
HAZARDOUS- PUNCTIONAL PUNCTIONAL FAILURE HODE FAILURE HOD	og:		DYMYCE	3	
HAZARDOUS- PUNCTIONAL PUNCTIONAL FAILURE HODE FAILURE HOD	PECT		SSOT	(9)	
HAZARDOUS- PUNCTIONAL FAILURE HODE FAILURE HODE HAZARD RELEASE HAZ			exocni	3	
M DESCRIPTION ONENT, MODE OF FION, FUNCTION) (2) WHICH-INDICATOR displayers STOP"			FIAES	€	
(2) (COMPONENT, MODE OF OPERATION, FUNCTION) (COME'd) SWITCH-INDICATOR A620741-2 (L6-82) "FUMP STOP"		HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	W - 5
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) SWITCH-INDICATOR A620741-2 (L6-82) "FUMP STOP"	
₹ ġ ☐ ; 170(A-154)		ITEN NO.			

NOTE

Villa de Marine

170 (A-154)

## (FALLURE MODES & FFECTS ANALYSIS - SYSTEM) SAEETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./REV.: 620587-1

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					-	NAEC-91-7958
•	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)			No problem: There are four Lamps, individually wired, which is a good arrangement. Also, the replacement of the lamp is a simple manner - can be performed quickly without tools.	occur. Periodic checks and maintenance drills will prevent or repair these remote fallures.	Mardly any real problem, even if this failure occurred just before (during?) the actual operation, because the HUD would be seen to be raising. NOTE: See 1.3.2.1.c, column 13.
HAZARD	30	PROBABILITY CCCURRENCE	(11)	o a	)	a
1	(7)	TAOTTISZAD BVSI GRASAH)	(11)	2 2		2
FAILURE	27 <b>37</b> 1	EATCEAR BY TOTAREGO	(10)	8 8 8		
	ION	POTENTIAL POTENTIAL	(6)			
	NOISSIM	SSOI	(8)		· · · ·	
ON	SYSTEM	DYNYCE	(2)		-	
EFFECT ON:	:	SSOT	(9)			
23	PEREONNEI	MUCNI	(2)			
	)SHBIG	TIAES	(+)			
HAZARDOUS.	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	a) One Lamp fails (burns out).		o) All four Lamps fail (open in Common lins).
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	SWITCH-IMDICATOR A620741-3 (L7-S5) "MID UP," has an Amber light and serves for diverting the hydraulic fluid flow under the Piston of the Hydraulic Cylinder and, therefore, for lifting the HUD up to its operational mode (contacts connections are typical		
	ITEN NO.			1.3.2.3		

NOTE: Hazard Low.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonab)y Probabie; C-Occasional; O-Remote; E-Extremely Improbable;
F-Improbable;

171 (A-155)

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#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM NAEC-91-7958

TABLE: UNIT 3A3

NAME: (Sub-system) CONTROL PANEL ASS'Y

DMG. NO./RBV.: 620587-1

-/95	7958									
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			this HOD cannot be raised by this local" switch. There is a redundant arrangement in the "remote" Switch S8, which could be used in such a case.	The HUD cannot be lowered.  It is a remote probability that this failure would occur, and it would represent a hazard only if there would be another perticular or unfavor- able condition, as for instance a storm coming that would not allow the quick failure repair.  It is believed that the pro- bability of this to occur is low enough (to accept the risk) particularly in a well- maintained System.					
IIA2ARD		TILITARORA SCHERRUCCO	(13)	U	۵					
1	(7)	TYOTTESAID TYGI GYAYAH)	(11)	111	H .					
FAILURE	27 271	DETECTAB BY SOTAREGO	(10)	X	* ·					
	SION	POTENTIAL BOSE	(6)							
	MISSION	SSOI	(8)							
NO.	SYSTEM	DAMAGE	(7)	,						
EFFECT ON:	SYS	SSOI	(9)							
- E	NNE	MULNI	(5)							
	PERSONNEL	FIAES	€							
	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	d) Switch fails (open in the 7-8 contacts on line).	e) Switch fails (short between contacts 7-8).					
ITEN DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(3)	(cont'd) SWITCH-INDICATOR A620741-3 (L7-S5) "HUD UP"							
	изем но.			1.3.2.3						

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
f-Imrossible; NOTE

V CAN BE WAY

172 (A-156)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

HAEC-91-7958

TABLE: UNIT 3A3

(Sub-aystem) CONTROL PANEL ASS'Y NAME:

DMG. NO./REV.: 620587-1

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							NAEC-91-7958
		SHOTHAN COM SENAMON	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)	(13)	No real problem, thanks to the redundancy built in. See the reasoning in item 1.3.2.3, a, b, and c, column 13.  The HUD cannot be stowed by this "local" switch. However, there is a redundant arrangement in the "remote" Switch 58, which could be used in such a case, or directional control valve can be manually operated.	The HUD cannot be raised with this failure. This would trepresent a problem if the HUD would be meaded in a hurry, because the Air Mcfor and menual operation of Directional Control valve would have to be used with the electr. power off.  • RECOMMENDATION: Provide a redundancy by connecting the contacts.	
3048	HALARD	<b>3</b> 0	PROBABILITY OCCURRENCE	(13)	ပ	۵	4
Ī	•		TYOTTICZĄD SVSI ORAZAH)	(11)	21	1	
	FAILURE		EATDETEC PE ROTARETO	(10)	8 8 9 8 X X	e o x	
		ION	POTENTIAL LOSS	(6)		×	
ļ		MISSION	SSOT	(8)		×	
į	5	SYSTEM	DAMAGE	(2)		×	
	BEFECT ON:	SYS	SSOI	(9)	·	×	
Ğ	3	NNE	XHOUNI	(2)		×	
		PERSONNEL	TIAES	3		×	
	HAZARDOUS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) One or up to all four Lamps falling to illuminate. b) Switch falls (open in the 7-8 contacts or line).	o) Switch fails (short between contacts 7-8).	
		COMPONENT MODE OF	OPERATION, FUNCTION)	(2)	SWITCH-IMDICATOR A620741-4 (L8-S6) "HUD DOMN," has an Amber light and serves for diverting the hydraulic fluid flow above the Piston and so to lower the MUD (contact con- nections are typical to the L5-81- see item 1.3.2.1).		
		ITEM	NO.	(1)	1.3.2.4		

Hazard Lov.1, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neviligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Oxcusional; D-Nemote; E-Extremely Improbable;
P-Impropable; NOTE

173 (A-157)

# (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE:

UNIT 3A3

(Sub-system) CONTROL PANEL ASS'Y NAME:

DMG. NO./REV.: 620587-1

of 15 Page 12

	ONOTHAGNAMACOGA GENERALOS	COMPLETES RECORDERINGS COMPLETED FOR CONTROLS OF SAFETY CONTROLS)	(13)	No real problem, thanks to the redundancy built in. In case of all four Lamps failing, the Pump's delivered pressure can be read on the Pressure Gauge.  No real problem. There is a redundant arrangement to check on the Pump's functioning: the Pressure Gauge on the Panel of the Hydraulic Power Package.  The Green light would come on as soon as the System is turned on, even before the Pump would start working. This inconvenient (falling) situation would be quickly repaired.	7
HAZARD		FROBABILITY C	(11)	U U A	
1	(C)	DIANGTETICACH)	(11)	2 2 1	
FAILURE	TE	DETECTAB BY SOTAREO	(10)	0 0 0 0 0 0 K K K	
	MISSION	POTENTIAL LOSS	(6)		
_	MIS	SSOI	(8)		
EFFECT ON:	SYSTEM	DAMAGE	(1)		
EFFEC		SSOI	(9)		
	PERSONNET	YAUCKI	(5)		-
-	PEP	LIVES	(4)		-
	HAZARDOUS- FUNCTIONAL	FAILURE WODE (HAZARD RELEASE MECHANISM)	(3)	a) One or up to all four Lamps failing to illuminate. b) Switch fails (open in the 7-8 contacts or line). c) Switch fails (short between the contacts 7-8).	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	SWITCH-INDICATOR A620741-7 (L1) "PUMP RUNNING," has a Green light and serves to indicate that the Pump is running. Really, this light indicates the closure of contacts in the Pressure Switch (item 1.2.4, Table "b"), which will close, normally, if the Pump is running and delivering the Hydraulic Fluid which would be under pressure.  The switch is wired identically to the A620741-1 (L5-S1), and serves to check on the L1 light (FTT-L1): "Press to Test the L1."	
	ITEH	NO.	ε	1.3.2.5	

Hazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
Elempinal Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; NOTE:

174 (A-158)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

.

NAEC-91-7958

(Sub-eyetem) CONTROL PANEL ASS'Y

UMI: NO./NEV.: 620587-1

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			NAEC-91-7958
COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Mo problem with up to three Lamps failing, due to the four-fold redundancy.  In case of all four Lamps failing, again there would be no danger that the HUD Ass'y could be raised, thanks to the interlock (LS3).  Mormally, there is no need to check on this light, since it is "on" when the System is "on" and the HUD Lid is down.  This check would be needed in case the Normally Closed contacts of the LS3 "BUD LID DOWN" Switch would be failing open (troubleshooting). The probability of both of these failures at the same time is very remote).	The warning Red light L3 would stay on even with the HUD LID raised, which would call for a quick failure isolation and repair.
PROBABILITY OF BOOM	(12)	u a u	۵
(HAYAI GHANAH)	(11)	2	11
SALEATTED  SACRAFIED	(10)	, te te te te te te te te te te te te te	**
SSOI TAITUAT OF SECOI	(6)		
SSOI	(8)		
TOSS SY SY ON TO SY O	(3)		
LOSS. SYSTEM NO.	(9)		
M TAUCHI	(2)		
TAUCHI ES TIALES	3		
HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) One or up to all four Lamps failing to illuminate. b) Switch fails (open in the 7-8 contacts or line).	o) Switch falls (short between the contacts 7-8).
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	SMITCH-INDICATOR A630741-8 (L3) "HID LID DOWN," has a Red light and serves to indicate that the HID LID is down, and, there- fore, the HUD Ass'y cannot be raised.  The Switch is wired identically to the A620741-1 (L5-S1), sea item 1.3.2.1, and serves to check on the L3 light (PrT-L3): "Press to Test the L3."	
ğ ç	ε	1.3.2.6	·

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Neasonably Probable; C-Occasional; D-Romote; E-Extremely Improbable;
P-Inprobable; NOTE:

175 (A-159)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A3

(Sub-system) CONTROL PANEL ASS'Y

NAMB:

620587-1 DMG. NO./REV.:

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5 <u>8</u>					
	COMMENTS. BECOMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	No problems with up to three Lamps failing, due to the four-fold redundancy.  In case that all four Lamps would fail to illuminate, there would be no real danger to the assembly, thanks to the interlock built in the Limit Switch LS2.  This failure in the System	check-out procedure would represent only a light delay.  It might become of importance, but only in connection with other failures (iS2- Normally Closed contacts would be closed) - extremely improbable.  The warning Red light L4 would stay on even with the HUD askew, which would call for a quick failure isolation and repair.
HAZARD		PROBABILLITY OCCURRENCE	(12)	υ <u>α</u> υ	M D
1		TYOTTISALD BVZI OSASAH)	(11)	2 H H	- 111
FAILURE	37	EATCETEG YE ROTAREGO	(01)	0 ×	<b>£</b>
	MISSION	POTENTIAL POSS	(6)		8
	MIS	5501	(8)		
ON:	SYSTEM	DAMAG	(2)		8
EFFECT		SSOI	(9)		
62	PERSONNEI	KULNI	(3)		
	PERS	FIAES	(4)		
	FUNCTIONAL	FALLURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) One or up to all four Lamps failing to illuminate. b) Switch fails	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	SWITCH-INDICATOR A620741-9 (L4) "HUD ASKEM," has a Red light and merves to indicate that the HUD Ass'y is not aligned for its lowering.  The switch is wired identically to the A620741-1 (L5-S1) - see item 1.3.2.1, and serves to check on the L4 light (PTT-L4): "Press to Test the L4."	
	ITEM	č.	(1)	1.3.2.7	

NOTE:

176 (A-160)

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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TABLE: UNIT 3A3

(Sub-system) CONTROL PANBL ASS'Y

DMG. NO./RBV.: 620587-1

NAMB:

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Page

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) (13) (12)SCHERENCE O ٥ - HAZARD NOTINOTITEZALE (JEVEL GYANAH) 111 FAILURE DETECTABLE BY OPERATOR? 000 Yes POTENTIAL S201 MISSION 6 SSOT 9 3 EPPECT ON SYSTEM DYWYCE 9 SSOT BREONNEI (2) XXOCKI Ξ TIAES HAZARDOUS-FUNCTIONAL PAILURE HODE (HAZARD RELEASE MECHANISM) problems E No problem foreseen. (S10) is a two-pole switch that serves to switch the HUD Console It is properly guarded with the Switch Guard MS25224-3. (COMPONENT, MODE OF OPERATION, FUNCTION) POGGLE SWITCH MS27735-22 System on and off. 2 Ξ 1.3.3 ITEH Š

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nex;ligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impressible) 

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177 (A-161)

(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A4 TABLE:

(Sub-system) CENTRAL JUNCTION BOX ASS'Y NAME:

620739-1 DMG. NO./REV.1

Page 1 of 9

	-SNOIT-VONAMNOCO - STRAMNOCO	(ACCIDENT PREVENTIONS) (ACCIDENT PREVENTION MEASURES)	(13)		The state of the s	(A-Frequent: B-Reasonably Probable; C-Oxxasional; D-Remote; E-Extremely Improbable; F-Imxesible)
HAZARD		YTT.TT.EA.BORG	(12)		TERM TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO	sional;
•		ITADITISZAD EVAI OHASAH)	(11)		A	C-Occa
FAILURE	1	DETECTAB BY OPERATOR	(10)		Henry Ins	robable
	MISSION	POTENTIAL POTENTIAL	(6)			ably F
	⊢	SSOI	(8)		High High High High High High High High	Reason
NO TO	SYSTEM	DAMAGE	(2)			14.
EFFECT	<u>i</u>	SSOI	(9)			A-Frequent; B
	PERSONNEI	YAULKI	(5)		1.1	ì
<u> </u>	NA.	SZAIT	(3)			٠.
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		37, para. 5.4.3.1	STD-882A, para.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	CENTRAL JUNCTION BOX ASSENBLY (Unit 3A4), dwg. 620739-1, contains several ferminal Boards, Relays, Indicator Lights, the V2 Transformer, Circuit Breaker, Fuse and Toggle Switch. It provides the central interconnection of the six harnesses: WO3 (Transformer, Unit 3A5); W204 and W216 (Junction Box, Unit 3A5); W204 and W217 (Control Panel, Unit 3A3); and W210 (Limit Switch Junction Box, Unit 3A6).	Hazard Level, Column 11, per HIL-SYD-88	Hazard Probability, Column 12, per MIL-STD-882A,
	ITEM	NO.	ε	•	NOTE: R	
				178 (A-162)		

# (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A4 TABLE: (Sub-system) CENTRAL JUNCTION BOX ASS'Y

620739-1 DMG. NO./RBV.:

NAME:

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		<del></del>		NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	wally Closed coltacts "N" (from AZ/A) to AZ/A) and to allow the HUD Up Sclenoid SOLI by closing its Nomally Open Contacts:  to AZ/B), when HUD UP command is axecuted.  1 Relay serves to prevent the operation of the HUD Up solenoid its No Contacts "N" (from AZ/A) to AZ/A) and to allow the contacts "N" (from AZ/A) to AZ/A) and to allow the last IUD DOWN command is executed.  (x) Yes III D There is a low probability that this would occur just when the HUD would have to be raised. And even for such a case, there is a clover deasign arrangement of having a spare Relay handy just above the failed one, and the replacement by plugging in is a matter of a soment. Similarly for lowering, except the time pressure would be somehow lower.
HAZARD		YTLITAABORG EMBRRUCCO	(12)	he HUD Down A2/A3 to A2/A 14 Howmall 1s executed.  to A2/A) a cxecuted.  The p tha tha tha tha tha tha tha tha tha tha
	E 9	TYDITIESAD ZVZI ORASAH)	(11)	Relay serves to prevent the operation of the HUD story by Closed contacts "A" (from A2/A) the HUD Up Science SOLI by Closing its No (from B2/B), when HUD UP command its execterly, this Relay serves to prevent the operation by opening its No contacts "A" (from A2/A) to A2/A to A2/A to A2/A to A2/A to A2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1), when HUD DOWN command is executed as B2/B1 to B2/B1).
PAILURE	271 271	DETECTAB BY SOTAREGO	(10)	tacts  tacts  Hub up  preven  preven  branch  res  res
	TON	FORE BOLENLIVE	(6)	end to end to end to end to end to end to end to end to end end end end end end end end end end
	MISSION	SSOT	(8)	
NO.	PEM	DAMAGE	3	mally to be
EFFECT	SYSTEM	SSOT	(9)	
EF	NNBI	MUCNI	(2)	This Relay serves to opening its No mally operator of the Nully and Similarly, this Relaysolution of from 82/81 to equipation of from 82/81 to 82/81 (from 82/81 to 82/8)
	PERSONNEL	SZAIT	3	sin in
-SIDOGGE AH	FUNCTIONAL	PAILURE MODE (HAZARD REIEASE MECHANISM)	(3)	K2-Mead-Up-Relay:  K2-Mead-Down-Relay  A) The coll (ki-righted (an open").
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	present Signation (RI & KZ and two sparse plugged in: KI & KA), with coll operating voltage: 200AC, 60Hz, 1 phase; coll operating our contact load rating per pole: 10 hap, resistive, 6 hap conductive at 120NAC, 60Hz, Minimus current: 0.04 hap half, 4 wave rectified. See Electrical Schematic Diagram 620590 for connections.  O
	ITBH		(1)	1.4.1

Mazard Krvil, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic) II-Criticul; III-Marginal; IV-Megligible)
Mazard Probability, Column 12, por MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Regionaly Probable; C-Occasional; I-Remote; B-Extremely Improbable;
P-ImpAssible; NOTE

179 (A-163)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A4

(Sub-system) CENTRAL JUNCTION BOX ASS'Y

DMG. NO./REV.: 620739-1

NAMB:

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		COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		The periodic inspections, maintenance drills and the ease of the replacement of the falled relay, designed in the System, will greatly reduce the probability of occurrence and the time to repair.	This could result in a serious problem (signs in parenthesds). However, it is expected that the Operational procedures (to raise the HUD with time to spare), together with the ease of the repair/replacement of the falled Relay, will result in a considerably reduced problem (signs without parentheses).	But there is a simple, inexpensive way to produce a redundancy against this failure:  • RECOMMENDATION: Wire the K2 Relay according to the circuit diagram at left.
0049411			YTLITEASORY DAGREDOO	(11)		Ů	<b>U</b>	U
1	١.	(T	inditicaad eval granah)	(11)		111	(11-1)	111
90111149	3		ETTECTAL BY COTASTAC	(10)		*	<u>;</u>	•
		NOI	POTENTIAL POTENTIAL	(6)			3	×
		MISSION	SSOT	(8)			8	
1		SYSTEM	DAMAGE	(1)			3	
100			SSOT	(9)			8	
5	ā	PERSONNEI	MUCKI	(2)			8	
_		SHEE	SZAIT	€			8	
	HAZARDOUS-	FUNCTIONAL	FAILURE WODE (HAZARD RELEASE MECHANISM)	(3)	b) WC contacts A fail to make contact.	1) In Kl: This would result in the failure to lower the HUD when needed.	11) In K2: This would result in the failure to raise the HUD when needed.	
	Mottatabad mast	NOTIFICATION PROPERTY	OPERATION, FUNCTION)	(2)	(cont'd) NELAY 518915-1	•	(K2) 10: (K2)	
	Teres	1167	Ç	(1)	1.4.1		Da C	502 B e e

180 (A-164)

NOTE:

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAFC-91-7958

BLE: UNIT 3A4

NAME: (Sub-system) CENTRAL JUNCTION BOX AGS'Y

DMG. NO./REV.; 620739-1

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Terror	NOT-SECRIPCION	HAZARDOUS-		M GIAN	<b>2</b>	ž į	MICO	3	FALLORE	•  .	HAZARD	
E	COMPONENT MODE OF	FUNCTIONAL	PERS	PERSONNEI	_ [	SYSTEM	MISSION	201	75	(TE		COMMENTS; RECOMMENDATIONS;
	OPERATION, FUNCTION)	PAILURE WODE (HAZARD RELEASE MECHANISM)	SZAIT	MUCNI	SSOT	DYWYCE	SSOI	POTENTIAL SECJ	IATOSTEG YE IOTARSTO	CLASCIFICAMI) EVEL GRAZARI)	YTT. IT. SA SONT DVBWHUCCO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)
(1)	(2)	(3)	€	(2)	(9)	(2)	(8)	(6)	(10)	(11)	(12)	(13)
1.4.1	(cont'd) RELAY 518915-1	o) MC contacts B fall to make contact in Ki and in K2: No problem, they are not wired. d) NO contacts A fall to make contact in Kl and in K2. e) NO contacts B fall to make contact wan headed.										No problem - these contacts are not wired. (What is not wired is the pin B3 in both Relays.)  NOTE: There is an error on the sketch of the K1 and K2 pin connections in the dwg. 620753-1 "Wiring Ass"y," Ireation 4 and 5-A. See corrected aketch in Item 1.4.1, page 2 of this Table.
		i) In Kl - would result in failure to raise the HUD.	3	3	3	8	8	3 ×	<b>; ;</b>		o o	This could result in a serious problem. However, it is believed that the design and the Operation and Maintenance procedures will reduce this potential problem (signs in parentheses) into a practically and easily managable task of raising the HUD ahead of time and, if needed, replacing the failing Relay. (signs without the parentheses). But there is a simple, inexpensive way to produce a redundancy against this

NAEC-91-7958

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 3A4

TABLE:

(Sub-eystem) CENTRAL JUNCTION BOX ASS'Y

DMG. NO./REV.: 620739-1

Page 5 of 9

	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	e RECOMMENDATION: Wire the Ki Relay as follows:	FPOM, (KI) TO: (KI)	-E0 ·			A3-0-X-A2	-		No real problem. When the HUD is commanded down,	there is usually more time	and to replace the failing	vided for in the design.	Extremely improbable: This	situation would require	simultaneously. (Fallure in		someone pressing the	WOOD BUTTON)		
HAZARD		PROBABILITY SOURCESSIES	(11)		FPON	•	7 50		9-9-			υ				M							
1		TEOTTICACI EVAL GRASARI)	(11)				ان	ه ن	~ ~	•	ļ					111							
FAILURE	371	EATDETEC BY ROTAREGO	(10)													¥.	•					-	
	MISSION	POTENTIAL SECI	(6)																				
	MIS	SSOI	(8)																				
r og	SYSTEM	DAMAGE	(1)									_											
EFFECT ON:		SSOI	(9)																				
Mar.	PEPSONNE	MOCKI	(2)						 							•							-0
	PEPS	TIAES	3						 														or 86
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)			<u>.                                    </u>			 			11) In K2: would result in	failure to	HUD.		f) Short between	NC contacts A	K2: this would	regult in a	possibility of	an inadvertent	by pressing the	local switch S
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) RELAY 518915-1		•																	
	ITEM	ġ.	(1)	1.4.1							-												

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraguent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improsable)

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# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A4

NAME: (Svb-system) CENTRAL JUNCTION BOX ASS'Y

DMG. NO./REV.: 620739-1

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			- +					NAEC-91-1	7958
	COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	No problem: the NC contacts B are not wired (what is not	wired in the B3 pin). No problem: the NO contacts A are not wired (A1 pins not		No real problem is expected to develop because of this possible failure mode, thanks to the anticipated timely check-out of the System and the ease with which the failed Relay would be localized and replaced.	This could result in a serious problem (signs in parentheses). However, it is expected that the System check-out procedures and the ease of finding and replacing the failing Relay will reduce the problem con-	siderably (signs without parentheses). But, there is a simple and inexponsive way to design in a redundancy against this failure:
HAZARD		YTLITEAEDAY DVGWWCCO	(13)				۵	. 0	۵
-	(7)	maditicaad avai omaan)	(11)	·			H	(I-IÌ)	11
FAILURE	र आ	EATCTAA YE KOTARAGO	(10)				***	e	<u>;</u>
	NOI	FOZENTIAL POTENTIAL	6)					8	ж
	MISSION	SSOI	€		=			8	<del></del> -
SNO SNO	TEM.	DAMAGE	63				×	3	<del></del>
EFFECT ON:	SYSTEM	SSOT	9			• · ·		3 .	•
	KNEI	MUCNI	(2)					3_	
	PERSONNEL	LIVES	3					3	
- Stooday & Ku	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	g) Short between MC contacts B,	in Kl or K2. h) Short between NO contacts A.	j) Short between NO contacts B	i) In Kl: this would result in raising the HUD as soon as the Pump would start running, and it could not be lowered.	ii) In K2: this would result in the failure to raise the HUD.	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont. d) RELAY 510915-1					
	ITEM	ġ	3	1.4.1				•	

NOTE: Hazard Loval, Column 41, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Marginal; IV-Manilyible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Oxcasional; D-Runoto; E-Extremely Improbable;
F-Improscible;

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A4

The State of the S

NAME: (Sub-system) CENTRAL JUNCTION BOX ASS'Y

DMG. NO./REV.: 620739-1

	COMMENTS DECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	• RECOMMENDATION: Wire the K2 Relay as shown in the sketch below:	(K2) 10, (K2) -0.0 10, (K2) -0
HAZARD		ENERS ENERS EN	(12)		FROM CREENE (K.2)
1:	NO (7)	ITADITISALD BVZI OFASAH)	(11)		
FAILURE	3.1	DETECTAB BY OPERATOR	(10)		
	MISSION	FOZENTIVT FOTENTIAL	(6)		
<u></u>	-	FOSS	(8)		
EFFECT ON:	SYSTEM	DAMAGE	(1)	-	
BPFB	L_	SSOT	(9)		
	PERSONNE	MUCHI	(5)		
-	8	FIAES	(3)		
	HAZARDOUS- FUNCTIONAL	FALLUR MODE (HAZARD RELEASE MECHANISM)	(E)	j) ii) (cont'd)	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) RELAY 518915-1	
	ITEM	<u> </u>	ε	1.4.1	194/2-169

NOTE: Hazard Adivals Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Necligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; I-Ramote; B-Extremely Improbable; F-Improbable; C-Occasional; I-Ramote; B-Extremely Improbable; F-Improbable; B-Cocasional; I-Ramote; B-Cocasional; B-Coca

184 (A-168)

NAEC-91-7958

NOTE: Mazard Acardy, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical: III-Marginal; IV-Nealigible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Proquent; 8-Roasonably Probable; C-Occasional; N-Romote; E-Extremely Improbable; P-Inyrosaible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-110D CONSOLE SYSTEM

IIAEC-91-7958

TO THE

TABLE: UNIT 3A4

NAME: (Svb-system) CENTRAL JUNCTION BOX ASS'Y

DMG. NO./REV.; 620739-1

Page 8 of 9

ROVISIONS FOR MEASURES FROLS)		nks tíon.	
COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	No problems foreseen, thanks to the designed-in protection.	
YTT.ITEABORY	(13)		
IVADITICZĄ I SVZI OZAZAH)	(11)		
DETECTAE YE OPERATOR	(01)		
POSE FORE	6)		
SSOT	9		
DAMAGE	(2)		
5501	(9)		
YAUCHI	(5)		
SZAIT	3		
FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	No problem fore- seen.	
OPERATION, FUNCTION)	(2)	TRANSFORMER 518984-1 (V2), with the primary and secondary windings as shown in the schematic diagrams shown here (the component and as wired in):	12%   12%
NO.	Ξ	3.4.2	181-5W2-2 181-5W
OBERTAL PRINCETON FAILURE HODE OF N	MECHANISM) LINE HE LEASE WE LE	(HAZARD RELEASE N F H H H H H H H H H H H H H H H H H H	TRANSFORMER 518964-1 (V2), with the primary and secondary windings seen.  The primary and secondary windings seen.  The primary and secondary windings seen.  The primary and secondary windings seen.  The primary and secondary windings seen.  The primary and secondary windings seen.

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

UNIT 3A4 TABLE

(Svb-system) CENTRAL JUNCTION BOX ASS'Y

NAME:

DMG. NO./REV.: 620739-1

NAEC-91-7958

	COMMENTS - RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	No problems foreseen.			
HAZARD		YTL IT SAMORY ENGROUSED	(13)	25	a	۵	۵
1	<b>67</b>	TROTAISZAD EVZI OHASAH)	(11)	111	)I	ži.	2
FAILURE	i	EATJETEC PE YE ROTARIGO	(10)	Yes	Yes	•	<b>1</b>
	MISSION	POTENTIAL POTENTIAL	(6)				
	MISS	SSOI	(8)				
No.	SYSTEM	DAMAGE	(1)				
EFFECT	1_	SSOI	(9)				
<u> </u>	PERSONNET	Keucni	(2)				
	)GUEL	SZAIT	3				
	PUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	No problem fore- seen.			
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	CIRCUIT BREAKER H39019/3-107 (CBI) provides the line protection between the V3 and V2 Transformers (the 115VAC side).	TOCCLE SWITCH MS23105-21 (SRT) is a three-pole switch used for the Relay Test Circuit switching on/off.	TOCCLE SWITCH MS25105-23 (57) is a three-pole switch used for the Pump Disable function (for the testing purposes).	INDICATOR (Light) MS25256-4 (LCE, LCD), Green light, with two Lamps each, is used to check the Relay with the coil energized and de-energized.
ITEM NO.			(1)	1.4.3	186 (A-	\$. 170)	1.4.6

NOTE: Hazard-Lawl: Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Warginal; IV-Neoligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable;
F-Improbable;

- Calendary

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

UNIT 3A5

(Sub-ayatem) TRANSFORMER ENCLOSURE

NAMB:

518928-1 DMG. NO./REV.1

of J Page 1

_					NAEC-31-7338
	COMMENTS . BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)		No problem foreseen.
HAZARD		YTT.TT.BABORY DVBHNIDOO	(12)		4
1		ITADITIESAID EVSI OHANAH)	(11)		Ħ
FAILURE		EATDETEC YE ROTAREGO	(10)		;
	MISSION	POTENTIAL LOSS	(6)		
	⊢	SSOT	(B)		·
T ON:	SYSTEM	DAMAGE	3		
EFFECT	<u>L</u>	SSOT	(9)		
	PERSONNEL	MUCHI	(4) (5)		
_	8	FIAES	3		
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		No problem foreseen.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	TRANSFORMER ENCIOSURE 518928-1 (Unit 385) contains the V3 Transformer 518928-2, which provides the step-down transformation of the ship's 440VAC to 115VAC used in the MMD System.  It is a 1.0KVA, 60Mz unit, bulk-head mounted.  See sketch at right.	TRAMSFORMER 518928-2 (V3). It is protected from both sides: on the primary side 440VAC, there are Fuses F2 & F3, and on the secondary 115VAC side, there is the Circuit Breaker CB1.
	ITEM NO.			3.5.0	1.5.1
				187 (A-171)	

. MCMF. Hagard Lowel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Newligible)
Inzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; M-Remonably Probable; C-Oscasional; M-Remote; E-Extremely Improbable;
[-Interestable]

of

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

FABLE: UNIT 3A6

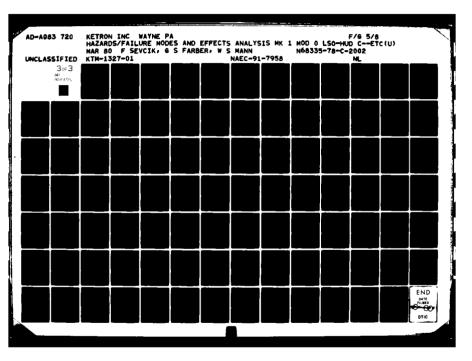
NAME: (Sub-system) LIMIT SWITCH JUNCTION BOX ASS'Y

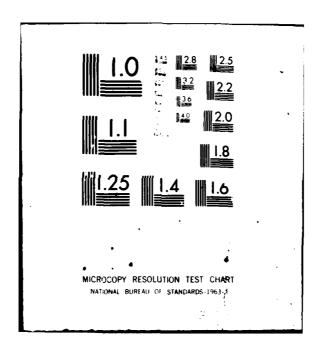
DMG. NO./REV.: 518929-1

COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS) COMMENTS; RECOMMENDATIONS; No problems foreseen in a wellassembled and checked-out (13) assembly. **EXPERIMENT** - HAZARD ۵ PROBABILITY OF (HAZARD LEVEL) 111 FAILURE STECTABLE
BY
OPERATOR? (T) 414475-1 3 PLACES Yea POTENTIAL MISSION 6) 8 SSOT FEE:21115239 8408399-1 EFFECT ON: SYSTEM 2 DAMAGE 620738-6 6(6)10TE 6) (2) SSOT EPSONNET (2) INJUKI 3 LIVES SENOTE S ENGRAVE AS SHOWN (HAZARD RELEASE MECHANISM) FAILURE MODE FUNCTIONAL HAZARDOUS-Œ the connections of the ends of the contains three Terminal Boards for Harnesses: W210 (from the Central Junction Box), W211 (Limit Switch LS1-HND Boxm), W212 (LS2-HND-Up), W213 (1S3-HND-Up), W214 (1S4-HND-Storage Lid On) and W214 (1S4 and LS5-HND Align). ASSEMBLY 518929-1 (Unit 3A6), (COMPONENT, MODE OF OPBRATION, FUNCTION) SWITCHES JUNCTION BOX ITEM DESCRIPTION 2 LIMIT 1.6.0 ITEM Ξ Š 188 (A-172)

....WIND. Mazard Levil, Column II, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mexiligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable;

F-Introstible)





### (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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NAEC-91-7958

TABLE: UNIT 3A7

(Sub-ayatem) PENDANT SWITCH ASS'Y MAME:

510925-1 DMG. NO./REV.

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THE RECEIPTION THE PRECEIPT ON					NAEC-91-7958
CCHEMENT WOUNDERSTORM THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAIND THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAINDOUGH THAIND THAINDOUGH THAINDOU					2000 HE C
COMPONENT ON THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THAT THE MAINTON PERSONNEL STREET ON THE SCHOOL STREET	AZARD			(12)	
TTEM DESCRIPTION FUNCTIONAL PUNCTIONAL PUNCT	1			(11)	
THEM DESCRIPTION  THAINDUST  COMPONENT, MODE OF TAILUNE HODE  OPERATION, FUNCTION)  PERLANGE GENERATION, FUNCTION)  (a) FUNCTIONAL PRIEBUSE NOT THE STATE OF THE	PAIL		BX	(10)	
TTEM DESCRIPTION   HARARDOUS-   PUNCTION   PUNCTION   PAILURE HORE   COMPONENT, MODE OF   PAILURE HORE   PAIL		NOIS	POTENTIAL SEOJ	6	
TTEM DESCRIPTION  (COMPONENT, MODE OF PAILURE HODE  OPERATION, FUNCTION)  PERSONNEL STREAM  (LIMIT MA), COMPONENT, MODE OF PAILURE HODE  (Unit MA), Composed of the Mediant Switch Si8924-1, cable, consector, etc., serves to operate the MUD Canado Switch on the Substanting the operator the advantage of a freedom of substanting the operator the advances of a freedom of substanting the operator the advances of the Substanting the operator the advances of the Substanting the operator the advances of the Substanting the operator the advances of the Substanting the operator the Substanting the operator the Substanting the operator the Substanting the operator the Substanting the operator the Substanting the operator the Substanting the Observation of the Substanting the Observation of the Substanting Subst		MIS	SSOI	(B)	# BOO
TTEM DESCRIPTION  (COMPONENT, MODE OF PUNCTIONAL PERFORMED OPERATION, FUNCTIONAL HAZARD RELEASE NO NEGRIANISM)  (MILL 3A), COMPONENT 319929-1  (Unit 3A), When not in use.  (2)  (3)  (4)  (5)  (4)  (5)  (4)  (5)  (4)  (5)  (4)  (5)  (4)  (5)  (4)  (5)  (4)  (6)  (6)  (7)  (8)  (9)  (9)  (9)  (9)  (9)  (9)  (9		STEM	DYMYCE	3	THE PERSON NAMED IN COLUMN
ITEM DESCRIPTION   HARABDOUS-   PERSONNE	PPEC		SSOT	9	
TTEM DESCRIPTION  (COMPONENT, MODE OF FUNCTION)  PENDANT SWITCH ASSEMBLY \$1892\$-1 (Unit 3A7), composed of the Pendant Switch \$18924-1, cable, connector, etc., serves to operate the MED Console System from a "remote" spot, enabling the operator the advantage of a freedom of movement and observation. This is the SS switch on the Schmaric Diagram \$50500. It remute on the Pendant Switch Bracket \$18926-1 (which is attached to the Enclosure Ass'y \$20586-1 of the Control Panel Ass'y \$20586-1 of the Control Panel Ass'y \$20586-1 if (Unit 3A3)) when not in use.	M2	ONNE	MOCNI	3	
(COMPONENT, MODE OF OPERATION, FUNCTION)  (2)  PERDANT SHITCH ASSEMBLY 518925-1 (Unit 134), composed of the Pendant Switch 518924-1, cable, connector, etc., serves to operate the HUD Console System from a Trancte" spot, enabling the operator the advantage of a freedom of movement and observation. This is the SS switch on the Schematic Diagram 620580. It rests on the Pendant Switch Bracket 518926-1 (which is attached to the Enclosure Ass'y 620580-1 of the Control Panel Ass'y 620580-1 (Unit 3A3)) when not in use.		PERS	SEVIL	€	
		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	
13 E. 2. 6		ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	PERMANT SWITCH ASSEMBLY 518925-1 (Unit 3A7), composed of the Fendant Switch 518924-1, cable, connector, sto., serves to operate the HUD Console System from a "remote" apot, enabling the operator the advantage of a freedom of movement and observa- tion. This is the 58 switch on the Schematic Diagram 620580. It tests on the Pendant Switch Bracket 518926-1 (which is attached to the Enclosure Ass'y 620586-1 of the Control Panel Ass'y 620586-1 (Unit 3A3)) when not in use.
	ITEM NO.		ġ	ε	1.7.0

(\*\* Wills, Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Newligible)

Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; In-Remote; B-Extremely Improbable;

F-Impossible)

189 (A-173)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 3A7

(Sub-system) PENDANT SWITCH ASS'Y KAME:

518925-1 DMG. NO./REV.1

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5 <u>8</u>						
		COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			A redundant provision is included in the design (the Switches 85 and 86). No problem would result.	phis could represent a serious problem, if the System would be needed to be raised (signs in the parentheses).  However, it is expected that the raising o' the System will be accomplished with some time before the actual need of it to allow for the check-out and a possible fallure identification/localifathor and repsir/replacement. (Operational and Maintenance Procedures.) Also, the Air Motor-H. Pump can be used!  The problem then would be greatly reduced! (Signs without parentheses.)
	- HAZARD		TILITANION DVBPNICOO	(13)	U	Δ M
•			TANDITICSAID BVSI (BIALVII)	(11)	N.	111
	FAILURE	ZI ETE	DETECTAB BY SOTARIGO	(01)	Yos	į į
		ION	FOLENTIAL	(6)		<u> </u>
		MISSION	SSOI	(8)		3
1	<u>.</u>	TEM	DAMAGE	3		3
	EFFECT ON	SYSTEM	SSOI	(9)		3
	2	NNET	MUCKI	(2)		3
		PERCONNET	SZAIT	€		£
		HAZARDOUS- FUNCTIONAL PAILURE HODE HAZARD RELEASE MECHANISM)			a) "Open" in the switch - would result in the lack of response of the HUD Console System to raise/retrect.	Switch (the contacts do not contacts do not contacts do not open when required) — would result in the HUD Console System "stuck" in the Up or Down position.  Thable Samt seed the seet of the HUD Console System "stuck" in the Up or Down position.  Thable Samt seed the seet of the se
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	PENDANT SWITCH 518924-1 (58) allows the operation (HUD UP and HUD DOMN) from a "remote" place.	Attac Switte Switte Pendi
	NO.			(3)	1.7.1	

Mazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; TV-Meniigibie) Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Impossible) i i

190 (A-174)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

HAFC-91-7958

(Svb-system) FUSE BOX ASS'Y

NAME:

620742-1 DMG. NO./REV. 1

			-	NAEC-91-7958
±	SNOTT-SCNAMMODER - STNAMMOD		(13)	No problems foreseen in a well-maintained system.
HAZARD	30°	YTTII AAGORY DAGWIIDDO	(13)	a in the second of the second
1		TVOTTICZAJO EVS.I (BRANE)	(11)	
FAILURE	37	DETECTAB BY COPERATOR	(10)	24353-2 24353-2 620038-0 6610056-0 910-000 on the welco-1 910-000 on the welco-1 910-000 on the welco-1 100-000 on the welco-1 100-000 on the welco-1 100-000 on the welco-1
	MISSION	Potential Potential	(6)	14353-2 14353-2 1610164 181000 on THRU 181000 on THRU 181000 on THRU 181000 on THRU 181000 on THRU
	MIS	SSOT	(8)	M.5.2 M.5.3 M.
T ON:	SYSTEM	DAMAGE	3	
EPPECT	L	SSOT	9	and the second s
_	PERSONNEL	YAUCHI	(2)	
	PER	TIAES	Ξ	
anouga e en	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	To problem in the contract of
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUPCTION)		(2)	fust box assement 620742-1 (unit 188), holds the two Puses (F2 and F3) in the Fuseholder and contains a Terminal Board Ass'y; it is interconnected with: the Motor Starter (Harness W202), the Transformer Enclosure (W207), and the Central Junction Eux (Harness W215).
	ITEM	9	ε	G
				191 (A-175)

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.? (A-Crasstrophic; II-Critical; III-Marginal; IV-Neoligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.? (A-Frequent; H-Reasonably Probable; C-Occasional; P-Homote; E-Extremely Improbable;
F-Inprobable;

8 of

- | Page

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-1100 CONSOLE SYSTEM

NAEC-91-7958

UNIT 4AI

621163) 621164) BIGNAL JUNCTION BOX (Schematic: 621173-1 (Sub-system) DMG. NO./RBV. ZZE:

Wirings

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS) 38 K AAI (13) (17) **ENGINE** - HAZARD (HAZAG DEVEL) (11) FAILURE OPERATOR? 600 DETECTABLE BY EL LIMMAN AND INPLY POTENTIAL POSS 6 MISSION 9 SSOI SUG'S INAN C EFFECT ON SYSTEM DAMAGE 9 SSOI EPEONNET (2) INJURY Ξ LIVES HAZARDOUS-FUNCTIONAL PAILURE HODE (HAZARD RELEASE MECHANISM) (3) (TELEBRICA) Contacts (Al, Bl, Cl and Dl) are wired to the Ship's input signals. face box (Unit 4A4) and the ewitch With the Test Simulator "plug Relay Power (115VAC to 28VAC), 12 Relays and a number of terminal See the Schematic Diagram at Signal Junction Box will transfer tacts and thus the Test Simulator console at the LSO platform, conged in" the Test Simulator Inter-The Signal Junction Box, located The Relays' Normally Closed the room area just below the to close the Mormally Open contains: 2 transformers for the right (Relays in "Ship's Input Mode"). actuated, the 12 Relays of the ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION) inputs will be handled. 3 5 TIEN 1.0 3 Š 192 (A-176)

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critic.1; III-Marginal; IV-Meniigible) Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prayment; B-Ressonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Impossible) É

Water Barrett

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MUU U LSU-INUU LONSOLE SYSTEM NAEC-91-7958

TABLE: UNIT 4A1

(Sub-system) SIGNAL JUNCTION BOX NAME:

DMG. NO./REV.: 621173-1

of 20 7 Page

ON: FAILURE - HAZARD	MISSION E C S S COMMENTS	<del></del>		The state of the s	(A-Prisquent; B-Rassonably Probable; C-Occasional; D-Rumote; E-Extremely Improbable; F-Impossible)
BPPECT	PERSONNEL SYSTEM	INDENI	(4) (5) (6) (7)		
	HAZARDOUS- FUNCTIONAL PE	M 65 ·	(3)	24, pares, 5, 4, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	-STD-682A, para. 5.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	provides for the transfer of:  a direct type identification alguals from the orosacheck aystem. SPH-43 alguals. FLOUS wave-off signals. FLOUS wave-off signals. Ramp motion and Ram triu adgnal from the Piolis tria harmonisation computer (all harlogue or varying or alguals) from Ship or Test Simulator to the MUD Consols.  AND  luzard Probability, Column 12, per MIL	
	ITEM	ġ	ε	193 (A-177)	

193 (A-177)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

MAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

Page 3 of 20

		COMMENDATE BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	Fall safe arrangement - good!	
HATABO	Juvau	-	PROBABILITY CONTRIBUCIO	(13)	a a	
۱ ا	١		INCITICALD SVALI GHASAH)	(11)	E E	
FA 11 110P	3	3.1.	DETECTAE BY OPERATOR	(10)	į,	7
		HOI	POTENTIAL LOSS	(6)	f	1
	1	MISSION	SSOT	(8)	,	
á	5	BYSTEM	DYWYC	(3)	1	
5000	79.2.		SSOT	9	t i	
	•	PRESONNEL	MUCKI	3	1	
L		PRRS	FIAER	3	(	
	HAZABDOUS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) Transformer fl:  1) Loss of the Primary power will cause the KI through KB reset to the ship's inputs mode- losing the A/C designa- tion for the Test Simu- lator input mode  ii) Loss of one of the two secondary windings function will cause the first eight Relays to return to, or stay in, the Normally Closed con- tacts that are in the Ship's mode-	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Transformer 422977-1. Frimary: 1199AC, 60Hz, 1 phase. Secondary: 289AC, 5.00 Amp. Two of these provide the current to the coils of the 12 Relays of the Signal Junction Box: Transformer T1 serves the Relays K1 through K8; and Transformer T2 serves the Relays K9 through K12.		
		ITEM	Š.	(1)	<b>:</b>	

Hazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; TV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible) NOTE

194 (A-178)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

Page 4 of 20

	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION NEASURES SAPETY CONTROLS)		(13)	Even if both of the Secondary windings' function would be lost, the result would be only to lose the Tat Simulator input mode in the Samp Motion & Trim and the SPW-42, returning the 4 Relays back to the Ship's input mode: fall safe arrangement.
HAZARD		YTLLIEARORY DIEDÜRÜDDO	(12)	a
1		TWOTTISZAD SVSI OFASAH)	(11)	111
PAILURE	37	DETECTAB YE ROTARAGO	(10)	2
	MISSION	POSS POTENTIAL	(6)	1
	MIS	SSOI	(8)	t
BFFECT ON	SYSTEM	DAMAGE	(2)	1
FFEC	L_3	SSOI	(9)	,
	PERSONNEL	XXCCNI	(3)	,
	PER	PIAES	3	ı
	PUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	1) Transformer T2:  1) Loss of the Primary power will cause the Belays Kg through Kl2 to reset to the Ship's inputs modelosing the PLOIS Bamp Motion & Triam and the Spe-42 for the Test Simulator input mode.  11) Loss of one of the two Secondary windlings function will cause no apparent problem, since one winding wild he enough to actuate the four Relays.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(3)	(cont.d) THAMSPORMER 422977-1
	NO.		ε	1

Hazard Level, Column 11, per MIL-STD-862A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Lizard Probability, Column 12, per MIL-STD-862A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Inproprietal MOTE

195 (A-179)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

HAEC-91-7958

TABLE: UNIT 4AL

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

Page 5 of 20

	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)		(13)	GENERAL NOTE: Since the contacts of these Relays are assured for the minisum current of 40 m Amp, and 10 Amp max, there will be fallures of the passage of the low current (40 mAmp or lower) after the 10A had gone through (in testing, for inst.).  Considering that very low currents signals (38 micro/Ampl) will be handled in the System, the following is recommended:  • RECOMMENDATION: Change the circuitry to assure the passage of the low current aignals:!!  (Current amplification?, solid state?)  These are failures affecting check-out with the Test Simulator function. The easy fault identification and	the part replacement will keep the System outage to the minimum.		
	HAZARD	8	PROBABILITY OCCUPAGENCE	(13)	ບ ບ ບ	ပ	ပ
İ	•		TINOTTIESAD SVSI GHASAH)	(11)	H H	11	111
	PAILURE	!	EATCETEC BY ROTAREGO	(10)	į į		
		MISSION	POTENTIAL S201	(6)	1 1	ı	1
		MIS	SSOT	(8)	1 . 1	ı	1
	NO J	SYSTEM	DAMAGE	(1)	1 1	1	1
	BFFECT		SSOI	(9)	1 1	1	1
		PERSONNEL	MUCNI	(3)	1 1	•	1
		SHE	SZAIT	3	1 1	1	1
	HAZARDOUS- FUNCTIONAL FAILURE HODE HAZARD RELEASE MECHANISH)		(3)	1) Open in the Coil - loss Coil - loss Lock-On, Mode I, II & III Bignals in the Test Simulator Mode.  41) Failure of the NO contacts to close upon actuations Al- Loss of "ACIS Lock-On" in Test Sim. Mode I Signal lost in T. Sim. Mode.	Cl- Mode II Signal lost in T. Sim. Mode.	Fil- Mode III Signal lost in T. Sim. Mode.	
	ITEM ITEM DESCRIPTION (COMPONENT, MODE OF NO. OPERATION, FUNCTION)			(2)	Relay 518915-1, socket mounted, 10 Amp, 4PDT; coll: 28VAC, 60HE, Single phase, max-operating current 0.55 Amp; contact: max-10 Amp resistive, 6 Amp inductive load at 120 Minimum current to be 0.040 Amp MHS, 4 wave rectified. Twelve relays used for: SPN-42, FLDLS (N-off, Namp Notion & Trim) & A/C Type Signals.  D3	The Normally Closed (NC) contacts carry Ship's imputs, the Normally Open (NO) contacts are for the Test Simulator mode of operation.	
				ε	196(3-190)		

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improsibile)

NOTE

196 (A-180)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM MAEC-91-7958

TABLE: UNIT 431

(Sub-system) SIGNAL JUNCTION BOX NAME:

DMG. NO./REV.; 621173-1

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									NAEC-91-7958	→
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)		(13)				The Maintenance procedure will assure a quick restoration of these functions.			
HAZARD		TILIEAEORT DIEBURUDDO	(173)				U			
1	E 2	inditiesad avai grandi	(11)				111			
PAILURE	ZI ZI	DETECTAB BY OPERATOR	(01)				! ~~	<u> </u>		
	MISSION	POTENTIAL POTENTIAL	(6)			1	•	•	1	
	MIS	SSOT	(8)			-1	ı	ı	1	
3	SYSTEM	DAMAGE	3			1	1	1	1	
EFFECT ON	L	SSOT	(9)			1	1	1	1	
<b>M</b>	PERCONNE	anoeni	(2)			1	•	•	1	
	PERC	SZAIT	€			1	1	1	1	
	ITEM ITEM DESCRIPTION FUNCTIONAL COMPONENT, MODE OF PAILURE MODE NO. OPERATION, FUNCTION) (HAZARD RELEASE MECHANISM)		(3)	a) K1	111) Pailure of the MC con- tacts to close upon deactuation:	Al- Loss of ACLS Lock-on in the ship's input mode.	Bl- Loss of MODE I in the ship's input mode.	C3- Loss of MOUS II in the ship's input mode.	D3- Loss of MODE III in the ship's input mode.	
			(2)	(cont'd) Belay 518915-1						
			ε	1.2		(A-181)	<u>. — — — — — — — — — — — — — — — — — — —</u>			

NOTE: Huzard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastruphic; II-Critical; III-Marginal; IV-Negligible)
Huzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Proquent; B-Rousonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
P-Intraciple)

197 (A-181)

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(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

(Sub-system) SIGNAL JUNCTION BOX NAE:

UNIT 4A1

TABLE

DMG. NO./REV.: 621173-1

,	· SNOILE CONSTRUCTION OF STRUCTURE OF STRUCT	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	These are failures affecting check-out with the Test
HAZARD		PROBABILITY OCCURRENCE	(12)	о <u>о</u>
1.	20	TYOTTISALD EVEL OMASAH)	(11)	
FAILURE	37	EATTECTAE BY ROTAREGO	(10)	X X X
	MISSION	POTENTIAL POTENTIAL	(6)	ı , f
	MIS	SSOI	€	1 1
S F	SYSTEM	SDAMAG	(2)	1 1
EFFECT	<u> </u>	ross	(9)	1 1
	PERSONNEI	YROUNI	(3)	1 1
_	PBRS	FIAES	3	1 1
	HATARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	1) Open in the Colli loss of ACIS and ISO Wave-off in the Test Simulator Mode.  11) Failure of the WO Contacts to Close upon actuation.  Al or Bl - Loss of ACIS Wave-off.  Cl or Dl - Loss of ISO Wave-off, in the Test Simulator Mode.
	ITEM ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(cont'd) Relay \$18915-1
				198 (A-182)

Hazard Level, Column 11, per HIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible) Hazard Probability, Column 12, per HIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Renote; E-Extremely Improbable; F-Impossible)

NOTE

198 (A-182)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

Page 8 of 20

•		COMMENTS, R COMPENSATI (ACCIDENT PRE SAPETY		(13)	The serious results of this failure would be as indicated only if other, radundant channels of communications also failed, and this particular failure were not cular failure were not vhich is right after the Test Simulator Mode functions.  It is expected that the Maintenance procedure will be efficient and quick in such repairs.	
00000	New In		PROBABILLITY OCCURRENCE	(12)	u u	
	١	NO (T	TASCITICATI) EVEL GRASAH)	(11)	H-1 H-1	
900	LALLE	21 211	DETECTAL BY OPERATOR	(10)	į į	1
		MISSION	POTENTIAL LOSS	(6)	и и	1
	L	-	SSOT	(8)	~ ~	
	PEFECT ON	SYSTEM	DAMAGE	(1)	×××	-
	2110		SSOT	(9)	и	4
		PERSONNEI	MOCKI	(5)	и и	4
-		PER	SZAIT	(3)	x x	4
	HAZARDOUS-	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	b) K2  111) Pailure of the NC con- tacts to close upon de-actuation  A3 or B3 - Loss of ACLS Wave-off in the Ship's input Node.  C3 or D3 - Lose of LSO Wave-off in the Ship's input Node.	
	ITEN DESCRIPTION (COMPONENT, MODE OP OPERATION, FUNCTION)		(2)	(cont'd) Relay 518915-1		
		ITEM	9	ε	7.7	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Na-gligible)
Huzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Namote; E-Extremely Improbable;
F-Innersible)

Wall bullering

199 (A-183)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD 0 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.; 621173-1

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58	<u> </u>					
•		COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			Test problem only.	These fallures would affect only the lights on the HUD Panel - easy and quick to repair.
	HAZARD		PROBABILITY CHEMINICOC	(12)	υ <b>υ</b>	<b>U</b>
	1	(T) (OM	ITADITIDAAD EVEL OMANAH)	(11)	11	Ħ
	FAILURE	SIEATOSTEG YE SMOTAREGO		(01)		
		MISSION	FOZE FOZE	(6)	ŧ	
		MIS	SSOI	(8)	t · 1	1
	ON	SYSTEM	DAMAGE	(7)	ı	ı
	EFFECT ON:	SYS	SSOI	(9)	1	. 1
	13	NNE	YRULNI	(2)	1 1	ı
		PERSONNEL	FIAES	•	1	, odd
	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)			(3)	d) K3  1) Open in the Colli Loss of signals for the A3, 4, 5 s 6 Aircraft in the Test Simulator Mode.  11) Pailvre of the Nv contracts to tacts to	actuation: A1, B1, C1, D1 - Loss of the corresponding signal (A3, A4, A5, A6) in the Test Simulator Mode.  111) Failure of the NC contacts to close upon deactuation: A3, B3 C3, D3 - loss of the corresponding signal (A3, A4, A5, A6) in the Ship's Input Mode.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	(cont.d) Relay 518915-1	·
	ITEH NO.				1.2	•
					200 (A-184)	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improstible;

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

(Sub-system) SIGNAL JUNCTION BOX NAMB:

DMG. NO./REV.: 621173-1

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_		ž,				<del></del>							NAEC	-74	- / 3:			$\neg$	
COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)			(13)		Teat problem only.								These failures would affect only the lights on the HUD	Panel - easy and quick to repair.	•				) -Pamote: E-Extremely Improbable:
HAZARD	Œ.	TILLIAAGORG DMSEKRUSSO	(12)		Ü		v						၁						sgligible
1		CASSIFTCAM	(11)		111		111				•		111					-	al, IV-N
FAILURE	23 378	IATOSTEC YS IOTAREGO	(10)	_	Xes.		Xee						**						I-Margin Probable
	TON	POTENTIAL LOSS	(6)		i _		ı						١						1; II
	MISSION	SSOT	(B)		ı								ı		•				Itica
ë O	TEM	DAMAGE	£		1		ı			_			,						2-11 2-11
BFFECT ON	SYSTEM	SSOT	(9)		t		1						,					No.1e	hite;
43	NNET	INJUKI	(2)		1		ı						,					nout	astro A-Ex
	PERSONNET	TIAES	3		ı		ı						,					, a, a	3
-SIMUS AND		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	d) K4	1) Open in the Coil: loss of Signals for the A7, TA4, EA6 and Cl	aircraft in the Test Sim- ulator Mode.	ii) Failure of the NO con-	tacts to close upon actuations	Al, Bl, Cl, Dl - loss of	ponding Sig-	EAG, C1) in the Test	Simulator Mode.	111) Fallure of	tacts to	deactuation:	loss of the	correspon- ding signal	(A7,TA4,EA6,	82A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	(cont'd) Reley 518915-1															Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)	
	ITEM	ģ	3	1.2															NOTE: 18

201 (A-185)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-1110D CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

NAME:

(Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

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	SNOTTENBERGORNES SENSIONS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES. SAFETY CONTROLS)	(13)	Test problem only.		These failures would affect only the lights on the MUD Panel - easy and quick to repair.
HAZARD		TTLIIEAEOFT CHEMINICO	(12)	. · ·	U .	U
1	<b>10</b>	TEXTETESALD SVELI GEASAH)	(11)	111	Ħ	111
FAILURE	3.1 5.	EATCETAG BY ROTARIGO	(10)	You		
	MISSION	POTENTIAL POTENTIAL	(6)	ſ	1	
Ì	MIS	SSOI	(8)		1	ī
ž Ž	SYSTEM	DAMAGE	(7)	ı	ı	1
EFFECT ON	١.	SSOI	(9)		1	1
	PERSONNEL	YAULKI	(2)	ı	1	1
<u> </u>	PER	SZAIT	(2)	ı	1	1
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) K5  1) Open in the Coil - loss of Signals for the 82, C2, E2, S3 Aircraft in the Test Simulator Mode.	the No contacts to close upon actuation: Al,Bl,Cl,Dl-loss of the corresponding signal (\$2,C2, \$2,83) in the Test Simulator Mode.	the NC contacts to close upon deactuation: All BJ(2), BJ(2
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Melay 518915-1		
	ITEM	ġ	ε	1.3		

Hazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improfibility

# (FAILURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE, UNIT (A)

(Sub-system) SIGNAL JUNCTION BOX MAME:

DMG. NO./REV.: 621173-1

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				<del>,</del>		NAEC-91-7958
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			Test problem only.		These failures affect the lights on the MUD Panel - repair is quick and easy.
HAZARD	30 30	PROBABILLTY CCCURRENCE	(12)	U	U	ပ
	(12)	TVOTTISZAD TVSI (OKASAH)	(11)	II.	Ħ.	
FAILURE	DETECTABLE BY OPERATOR?		(10)	# 0 X	<b>.</b>	3
	MISSION	POTENTIAL LOSS	(6)			
	MIS	SSOT	<b>@</b>	1	1	1
T ON	SYSTEM	DAMAGE	2	ı	·	ı
BPPECT ON:		SSOT	9	1 .		1
	PERSONNET	XHUCNI	(5)	,	1	1
		TIAES	3	1	1	
LA918BDOUIG	HAZARDOUG- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	f) K6  i) Open in the Coil - loss of signals for the Pl4, F9,F4 & El Aircraft in the Test Simulator Mode.	the No contacts to close upon actuation: Al,Bl, Cl,Dl - loss of the corresponding signal (RI, P4,F8,F14) in the Test Simulator Mode.	the NC contacts to close upon deactuation A3,81,C3,D3-1099 of corresponding 619nal (E1,F4 F8,F14) in the Ship'
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)			(cont'd) Relay 518915-1		
	NO.			h.2		

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Huzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; U-Remote; E-Extremely Improbable;
F-Improbable; NOTE:

13 of 20

Page

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

The second secon

TABLE: UNIT 4A1

(Sub-system) SIGNAL JUNCTION BOX

NAME:

DMG. NO./REV.: 621173-1

NATC-91-7958

<u> </u>					
	COMMENTS, RECOMMENDATIONS,	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	Test problem only.	These failures affect the lights on the MUD Pasel only - repair is quick and easy.
- IIAZARD	 	PROBABILLTY CCURUENC	(12)	υ <b>ບ</b>	U
	(T	evalioaan Tanditiaan	(11)	H H	111
FAILURE	DETECTABLE NA OPERATOR?		(10)		
	NOI	POTENTIAL LOSS	(6)		•
	MISSION	SSOI	9	1	1
. No	LEM L	DYMYCE	(7)	1.	1
EFFECT ON:	SYSTEM	SSOT	(9)	,	1
EF	INE	THOCHI	(2)	1	Input Hode.
	PERSONNE	SZAIT	(0)	1 1	- Input
		FAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	1) Open in the Coil - loss of Signals for the (T2,T28, F18 & "Spare" Aircraft in the Test Simulator Mode.  11) Pailure of the NO contacts to close upon actuation: A1,B1,C1,D1-loss of the corresponding Signal (T2, T28,F18 & spare") in the Test Simulator Mode.	111) Pailure of the NC contacts to close upon deactustion: A3,B3, C3, D3-loss of the corresponding signal (T2,T28, F18 & "Spare") in the Ship's
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	(cont'd) Relay \$16915-1	
F. G.			ε	204 (A-188)	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Megligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F qali;

204 (A-188)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

(Sub-system) SIGNAL JUNCTION BOX NAME:

DMG. NO./REV.: 621173-1

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UNE - HAZARD  COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS COMPENSATING PROVISIONS CARACTER (ACCIDENT PREVENTION MEASURES SARETY CONTROLS)			(11) (12) (13)	III C That problem only.	5 4 3 1 (I-Catastropic: II-Critical: III-Marcinal: IV-Wedicible)
PAILURE	1	DETECTAE BY DERATOR	(10)	j j	Marai
	MISSION	POTENTIAL S201	(6)	1	
	MIS	SSOT	(8)	i	
3	SYSTEM	<b>ENANAGE</b>	(1)	1	
EFFECT ON:		SSOT	(9)	t t	
<b>≅</b>	PERSONNEI	MUCNI	(2)	1	
	PBRS(	FIAES	(4)	i .	<del>\$</del>
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	h) KB  1) Open in the Coil - loss of Signals for the "3 future Aircraft deasy-nations" and all the Aircraft deasy-nations in the Test Simulator Mode (loss of 280 return).  11) Failure of the Mo contacts to Clost of 280 return).  11) Failure of the Contacts to Clost of 280 return).  11) Failure of the Contacts to Clost upon actuation alloss of the Corrasponding Signals ("spare", "spare", "spare") in the Test Simulator Mode.	
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	(cont'd) Relay \$18915-1	State of the state	
	ITEM	ġ Ž	ε	7.3	

205 (A-189)

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of 20

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(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

(Sub-system) SIGNAL JUNCTION BOX NAME:

UNIT GAI

TABLE:

621173-1 DMG. NO./REV.

8				
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAPETY CONTROLS)			The failure of the C3 contact would affect (all) the lights of the A/C basignations on the HUD Panel - repair is quick and easy.
HAZARD	.30 .30	PROBABILITY EDIEMBERODO	(12)	υ
JRE -	<u> </u>	TROTTERAD SVZI GRAZAH)	(11)	II.
FAILURE	DETECTABLE SY SROTARISO		(10)	Y C.
	MISSION	POTENTIAL SEOJ	(6)	1
	MIS	ross	(8)	
NO.	SYSTEM	DYMYCE	(2)	1
EFFECT ON:		SSOI	(9)	1
-	PERSONNET	MUCNI	(2)	ı
	PERS	SZAIT	3	ı
	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	h) K8  111) Failure of the NC contracts to close upon deactuation: A3,B3,C3,D3-loss of all 51gnals for the Aircraft Designation in the Ship's Input Mode (C3 carries the 28v return!!)
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) Relay \$10915-1
	NO.			1.2

NOTE

206 (A-190)

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O USO-HUD CONSOLE SYSTEM MAFC-91-7958

TABLE, UNIT 4A1

NAME: (Sub-system) SIGNAL, JUNCTION BOX

DMG. NO./REV.: 621173-1

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					NAEC-91-7958
	COMMENTS, RECOMMENDATIONS,	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAPETY CONTROLS)	(13)	Test problem only. However, due to the importance of this relay to work properly in the Ship's Input Mode, see the next entry below.	DANGER! According to the System design analysis, the Signals for the Reap Notion and Trim will be 0-28 micro Amp currents! With the Relay's contacts rating of 40 milliAmp as minimum, this will not work and the circuit will have to be reworked. See the "General Note" 6 "RECOMMENDATION! in item 1.2.a (page 5).
HAZARD	3 30 30	YTLLIEAECHT CHUBBERCOO	(13)	<b>∪</b> •	4
	(E)	MADITIESALD EVAL GEASARI)	(11)	X II	M
FAILURE	ड्या डा	DETECTAE BY OPERATOR	(10)		
	MISSION	POTENTIAL POTENTIAL	6)		3
	MIS	SSOT	9		3 9
EPPECT ON	SYSTEM	<b>EDAMAG</b>	2	. 1	(x)
PPEC		SSOT	(9)	1	æ .d.
N N	PERSONNEI	REDCHI	(2)	1	X g
	PERS(	SZALT	(4)	1 1	(E)
OIN/UGA SAN	FUNCTIONAL	FAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	1) K9  1) Open in the Coil - loss of the Ramp Motion and Trim Signals in the Test Simulator Mode.  11) Pailure of the NO contacts to close upon actuation:  21 Or Di-lose of the Cortesponding Signal Motion, Trim Signal Motion, Trim Motion,	Simulator Mode.  Jii) Pallure of (x) (x) (x) (x) (x) the MC con- tacts to close upon deactuation: A3 or B3, C3 or B1-lose of the corresponding Signation and (Ramp) Mode.
		OPERATION, FUNCTION)	(2)	(cont'd) Belay 516915-1	
	ITEM	Ž	3	1.2	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-Hansonably Probable; C-Occasional; D-Renote; E-Extremely Improbable;
P-Theoremials

207 (A-191)

(FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 4A1

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

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38   			S			- 5 5
		SNOITEGNAMHODAR - STRAMHOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Test problem only, but due to the sarious situation in the Ship's input Mode (see below), an improvement will have to be provided.	DANGER! According to the System design analysis, the Signals for the Ramp Motion and Trim will be 0-28 micro-Amp currents! With the Relay's contacts rating of 40 milliamp as minimum, this will not work and the circuit will have to be reworked. See the "General Mote" & "MECOWMENDATION" in item 1.2.a (page 5)
	HAZARD	20	ENCENBELLITY CCCUPARAILITY	(12)	υ <b>&lt;</b>	<
	ŧ		TAOTTISZALD SVELI OHAZAH)	(11)		
	PAILURE	37	DETECTAB BY ROTAREGO	(10)	<u>.</u>	3
Ī		MISSION	POTENTIAL LOSS	(6)	i i	8
		MIS	SSOI	(8)	, ,	Ê
	<u> </u>	SYSTEM	DAMAGE	(7)	t t	8
	BPPECT	_	SSOI	(5)	1	×
	<b>≥</b> C	PERSONNET	YMULKI	(2)	\$ I	(X)
		PERS	FIAES	3	i I	(x)
		FUNCTIONAL	FAILURE MODE (INZARD RELEASE MECHANISM)	(3)	1) Open in the Coll-loss of the AirSpeed and Rate of Descent Signals in the Test Simals in the Tor Mode.  11) Fallure of the NO contacts to close upon actualion: Al or Cl, Bl or loss of the corresponding signals (TAS, CAS, Rate of Descent) in the Test Simalator Mode.	MC contacts  Woon de- actuation: A3  Or C3, B3 Or C3, D3 - loss of the corms- ponding sig- nals(TAS, CAS)  Rate (TAS, CAS)  Rate (TAS, CAS)  Rate (TAS, CAS)
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay \$18915-1	
		ITEN	O	ε	7.	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improved 11. MOTE:

208 (A-192)

# (FAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 4A1

NAMB: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

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ITEM DESCRIPTION  (COMPONENT, MODE OF PAIL  (HAZA HECATION)  (1)  (2)  (2)  (2)  (2)  (3)  (4)  (1)  (1)  (1)  (1)  (1)  (1)  (1							NAEC-91-7958
COMPONENT, MONE OF PUNCTIONAL PERCONNENT, MONE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE HORE OF PAILURE OF PAIRURE OF PAILURE OF PAIRURE O		-SNOIT-CONSUMOUS - STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION HEASURES) SAPETY CONTROLS)	(13)			
HAZABOUS   PRICE ON   PAILURE   PERCONNEE   SYSTEM   HISSION   PAILURE   P	AZARD			(113)	U	4	4
ITEM DESCRIPTION   HALABOOUS-   PERECONNET SYSTEM HISSION   COMPONENT, MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE MODE OF PAILORE OF THE MODE OF PAILORE OF THE MODE OF PAILORE OF THE MODE OF PAILORE OF THE MODE OF PAILORE OF THE MODE OF THE MO	١.	<b>6</b>	Thoratel Tval (5/42/8)	(11)	H		н
TTEM DESCRIPTION   FUNCTIONAL   PERECANEL   SYSTEM   HISS	FAIL	<b>37</b>	DETECTAB	(10)	į	<u>;</u>	į
TTEM DESCRIPTION   PUNCTION   PARABOUS   PARABON   PAR		SION	POTENTIAL LOSS	(6)		ı	3
ITEM DESCRIPTION  (COMPONENT, HODE OF PUNCTIONAL OPERATION, FUNCTION)  (1)  (2)  (1)  (2)  (3)  (4)  (5)  (5)  (6)  (7)  (7)  (1)  (8)  (9)  (9)  (1)  (1)  (1)  (1)  (1)  (2)  (3)  (4)  (5)  (5)  (6)  (7)  (7)  (8)  (8)  (9)  (9)  (1)  (1)  (1)  (1)  (1)  (1		HIS	SSOT	(8)		ı	3
ITEM DESCRIPTION  (COMPONENT, HODE OF PAILORE HODE OF PAILORE HODE OF PAILORE HODE OF PAILORE HODE OF PAILORE HODE OF PAILORE HODE OF OPENATION, FUNCTION)  (2) (3) (4) (5) (7) (9) (1) (1) (2) (1) (2) (3) (4) (5) (4) (5) (4) (5) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6	8	STEM	DAMAGE	_	1	•	3
(COMPONENT, MODE OF PUNCTIONS PERFORMED OPERATION, FUNCTION)  (HAZARD RELEASE MODE OF PUNCTION)  (HAZARD RELEASE MODE OF PUNCTION)  (HAZARD RELEASE MODE OF PERFORMENT MODE OF PERFORMEN	FFEC	ŧ	SSOI	(3)	1	1	3
(COMPONENT, MODE OF PATLURE HODE (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT, MODE OF (COMPONENT) (COMPONEN	<b>M</b>	ONNE	YMUCNI	(2)	1	6	<u> </u>
(COMPONENT, HODE OF PAIL OPERATION, FUNCTION)  (12)  (2)  (20)  (20)  (3)  (1)  (1)  (1)  (1)  (1)  (1)  (1	_	PERC	SZAIT	3	1		(x) (x) (y)
	Lagaborio	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	<b>3</b> 3		<b>H</b>
1.2 (I) 1.3 (I) 1.4 (I) 1.5 (I		ITEM DESCRIPTION	OPERATION, FUNCTION)	(3)	(cost'd) Relay 518915-1		
I		ITEM	<b>9</b>	3	1.2		

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Proquent; B-Responshly Probable; C-Occasional; D-Remote; E-Extremely Improbable;
P-Impressible)

209 (A-193)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A1

NAME: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

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58						
		SNOTTENDENDOS - STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	Test problem only, but will have to be corrected - see below.	DANGER! According to the System design analysis, the Signals for the Ramp Hotion and Trim will be 0-28 microhap currents! With the Falsy's contacts rating of 40 milliamp as minamm, this will not work and the circuit will have to be reworked. See the "General Note" 6 RECOMMENDATION" in item 1.2.a (page 5).
	- HAZARD		TTLILEARORY COMBUNICO	(13)	ບ ∢	<
	1	100	TYOTTESALD SVAL GRASAH)	(11)	H H	H
	FAILURE	271 271	DETECTAR BY ROTARISO	(10)		
		MISSION	POTENTIAL LOSS	6)	· · · · · · · · · · · · · · · · · · ·	Ð
	_	HIS	SSOI	<b>a</b>	. 1	3
	8	SYSTEM	DAMAGE	(1)	1 1	(8)
İ	EPPECT	<u></u>	\$501	છ	1	æ
	M	BREOWNE	MUCKI	(2)	1	8
		SHE	FIAES	€	i t	3
		FUNCTIONAL	FAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	m) K12  1) Open in the Coil-loss of the Latituda Error ("BugK")  5. Range Signals in the Test Signals tor Mode.  11) Failure of the NO Contacts to Close upon Error Close upon Error Contacts	DI-loss of the corresponding Signals (Lat. Errox, Range) in the Test Simulator Mode.  All Fallure of the NC contacts to close upon deactuation: All Or Di-loss of the corresponding Signals (Lat. Errox, Range) in the Ship's Imput Mode.
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Rolay 518915-1	
		Mari	NO.	3	2	

NOTE

210 (A-194)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

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MAEC-91-7958

TABLE, UNIT 4A1

MAMR: (Sub-system) SIGNAL JUNCTION BOX

DMG. NO./REV.: 621173-1

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	_		_		_	_		NAEC-91-7958
	COMMENTS - RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)					
HAZARD	3 30	PROBABILLTY DREMENDO	(12)				,	
[1]	(T	inchiesad Val Grassi	(E)	9000		arti-		
PAILURE	ZI ZI	DETECTAB BY OPERATOR	(10)		and the periodic	out -	:	
	MISSION	POTENTIAL POTENTIAL	(6)	9	, and the	procedures are carrie	441.	
	MIS	SSOI	(8)	744		Are c	o the	·
NO	SYSTEM	DAMAGE	(1)		9	ures	49e t	
EFFECT ON		SSOT	(9)		shecked out	roced	1) day	
<b>SA</b>	PERSONNEI	XHOCNI	(2)	•		nce	dent	
	PERS(	FIAES	(4)		have been checked ou	intan	Y Acc	
n sandreig.	PUNCTIONAL	PAILURB MODE (HAZARD RELEASE MECHANISM)	(3)		the connections	check-out and Mintenance	cularly after any accidental damage to the 4Ml.	
	ITEM DESCRIPTION	OPERATION, PUNCTION)	(3)	Consector 31 & 32	Tarminal Boards 781-7812		Inside Wiring	
	ITEN	ģ	ε	1.3	7.4	;	1.5	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Franchable; C-Cocasional; D-Remote; E-Extremely Improbable;
P-Interestible;

NOTE:

211 (A-195)

# CFALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

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t1AEC=91,=7958		
•		
TABLE: UNIT 4A2 NAME: (Sub-system) SYNCHRO JUNCTION BOX	21187-1 (Schematic: 621120) (Wiring: 621123)	
TABLE: UNIT 4A2 NAME: (Sub-syste	DMG. NO./REV.: 621187-1 (Sche	

8				·
	- SHOTT-GURANDOGA - STUBAROO		(13)	te transfer relays (kl-Ke. The ke relay is a spare), and a number of terminal safer of the following signals (either from the Ship or the Test  (AAZ)
HAZARD		TILITEAEORY EMBRICOO	(13)	
1		TYNDITISAED EVEL GEASAH)	(11)	Contains One The KB relay is calther from the Calther fro
FAILURE	1	DETECTAE BY ROTAREGO	(10)	e following signals (either following signals (either following signals (either following signals)
	MISSION	POTENTIAL POTENTIAL	(6)	transfer of the following sign transfer relays (KI-KB. transfer of the following sign transfe
	MIS	SSOT	(8)	
NO.	SYSTEM	DAMAGE	(1)	transfer transfer transfer transfer transfer of the constant o
BFFECT	SYS	SSOI	(9)	To the state of th
巫	PERSONNEL	XXOCNI	(2)	7000000 (35-7-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-
	PERS	TIAES	3	
O C C C C C C C C C C C C C C C C C C C	FUNCTIONAL	FAILURE HODE (HAZARD RELEASE MECHANISM)	(3)	n the room area just below the fin the schematic below), algue rovides for the elektrical transcent of the AC.  deck) of the AC.  deck) of the AC.  provides for the elektrical transcent of the AC.  deck of the AC.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	The Synchro Junction Box, located ential transmitters (81, 82, 83 & stripe. The Synchro Junction Box (Simulator) to the HDD Console:  • Wind Direction and velocity • SPN-44 True Air Speed (TAS) • Deck status (clear deck, fou
	ITEM	<b>6</b>	(1)	1 1 1 1
				212 (A-196)

... NOTE: Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; B-Extremely Improbable;
F-Impressible)

717 (W-130

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A2

• . .

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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_				NAEC-91-7958	
	SNOTH-CHARMOOS SENSENDED	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Fail safe attangement - good!	
HAZARD		CONTRIBUTION CONTR	(13)	a .	
١.	(HAZANG LEVEL)		(11)	H H	
FAILURE	27 271	DETECTAN BY HOTAKITOR	(10)	Yes .	
	MISSION	POTENTIAL 220.1	(6)	1	
	MIS	SSOI	9		
EFFECT ON:	SYSTEM	DAMAGE	3		
FFEC		SSOT	(9)	1	
	PERSONNET	XXOCNI	(3)	1	
	PRRS	FIAES	€	,	
	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	1) Loss of the Primary power will cause the KI thru K7 reset to the Ship's Input Node losing all the Signals through this Unit 4A2 in the Test Simulator Mode.  11) Loss of one of the two secondary windings function will cause the seven Relays to return to or atay in the Normally Closed Contacts, which is in the Ship's Input Mode.	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Transformer 422977-1.  Primary: 115VAC, 60Hz, 1 phase Secondary: 28VAC, 5.00Amp.  The secondary uluding provides the current to the colls of the seven active Relays of the Synchro Junction Box (the 8th Belay is a spare).  The Transformer is marked Tl on the Schematic Diagram.  The current is sent through the coils of the Relays upon their actuation by a switch on the Test Simulator is properly connected: the System in the "Test Simulator Mode."	•
	ITEM	9	ε	1	

NOTE: Hazard Lowil, Column 11, par MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Mayligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IV-Remote; E-Extremely Improbable;
F-Ingressible)

213 (A-197)

## (FALLURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFITY ANALYSIS MK! MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX

NAMB:

DWG. NO./REV.: 621187-1

Page 3 of 21

5 <u>8</u>						
	COMMENTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	This failure affects the Test check-out, not the Ship's Input Mode.	Even though these failures would affect only the Test procedures due to their high probability of occurrence, an improvement in the dealgn is recommended. See below, item 1.2.a.iii.	
HAZARD		YTLLIEARORG ENGBBILDDO	(12)	U	a a.	:
1	(T)	ITADITISZALD EVELI ORASAH)	(11)	111	111	
FAILURE	ĺ	DETECTAB BY ROTARIEO	(10)	Kon Kon Kon Kon Kon Kon Kon Kon Kon Kon		
	MISSION	POTENTIAL POTENTIAL	(6)	ı	3	
	MIS	SSOI	(8)		1 8	
NO.	SYSTEM	<b>EDAMA</b> CE	(1)	1	1, 3	
EFFECT ON:		SSOI	(9)	•	¹. <u>3</u>	
i i	NNE	YMUCKI	(2)	1	. 3	3
	PERSONNEL	TIAES	(4)	1	, 3	3
DINOGRAPAN	FUNCTIONAL	FAILURB MODE (HAZARD RELEASE MECHANISM)	(٤)	a) Kl i) Open in the Coil-Loss of the Wind Angle Signals in the Test Simulator Mode.	the No con- tacts to close upon actuation: Al, Bl, Cl (Dlnot wired) -Loss of the Sl,S2 & S3 Wind Angle Signals in the Test Simulator Mode.	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Relay 518915-1, Socket mounted, 10Amp 4PpT. coll, 28VAC, 60Hz, 51Hg, 28VAC, 60Hz, 51Hg, 28VAC, 60Hz, 51Hg, contacts; max 10Amp resistive, 6Amp inductive load at 12UVAC, 60Hz. Hinimum current (contacts) to be 0.040Amp PMS, y wave rectified. There are seven helays for the transfer of Signals	(Wind Velocity & Angle, SPN-44 TAS & CAS, Deck Status) to the MUD Console. The Normally Closed Contacts (NC) carry the Ship's Imputs, and the Normally Open (NO) Contacts are for the Test Simulator Mode of Operation.  NOTE: From the Design Analysis, the Signals that are being transferred in this Synchro Junction Box are 0-28 milliamps strong.	
	ITEM		î	1.3		

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; TV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; I-Remote; E-Extremely Improbable;
F-Improbable; NOTE

214 (A-198)

# (FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD 0 LSO-HUD CONSOLE SYSTEM

Complete Transfer . MAEC-91-7958

TABLE: UNIT 4A2

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(Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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		16		NAEC-91-7958	_
	SNOTTHENDS - SECONDARIODA		(13)	the reliable passage of the low current Signals through (the contacts).	1 (I-Catastrophic; II-Critical; III-Marginal; IV-Medilgible) 5.4.3.2 (A-Prement: B-Reasonably Probable; C-Occasional; P-Menote; E-Extremely Improbable;
HAZARD		YTLIEABORG COCERENCO	(11)		qligible)
1	83	TVOLTICZALD ZVZI OKAZAB)	(11)		1, IV-Ne C-Occas
FAILURE	डा डा	EATDETEC YE YOTAREGO	(10)		-Hargina robables
	ION	POTENTIAL LOSS	(6)		III to
	MISSION	ross	(8)		tical
NO NO	TEM	39AMAG	(2)		
BEFECT ON:	SYS	SSOT	(9)		hic;
	NNET	YAULNI	(2)	,	Strop A-Fre
	PERSO	FIAES	3		3.2 C
-BIIOGGT 6 TH		FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	4) K1	5.4.3. para.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1	Hazard Level, Column 11, per MIL-STD-882A, para. Hazard Probability, Column 12, per MIL-STD-882A,
	ITEM	ġ	3		NOTE: HE

215 (A-199)

(FALLURE MODES & FEFECIS ANALYSIS - SYSTEM) SAFETY ANALYSIS "KL MOD O 150-HUD CONSOLE SYSTEM

RAEC-91-7953

TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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58						
	COMMENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	This failure affects the Test check-out, not the Ship's Input mode.	Even though these failures would affect only the Test procedures due to their high probability of occurrence, an improvement in the design is recommended. See below and item 1.2.s.iii.	DANGER! There is a certainty that the contacts, after their test in the 10Mmp strong current, will not pass a weak current, even the 40 milliamp is too weak! That means that the situation as it is right now will not work!  • RECOMMENDATION: Introduce the necessary changes in the Design and procedures (test)
HAZARD		YTLIIAABORG DMANNICCO	(12)	U	•	
1	(T)	TROTTICZAD BVZI ORANAH)	(11)	ij	Ĭ.	11-1
FAILURE	27 37	DETECTAE BY COERATOR	(10)	8 0 24		<u>.</u>
	ION	FOLENTIAL	(6)	J	•	3
	MISSION	SSOI	(8)	ı	1	8
Š	SYSTEM	DAMAGE	3	1	1	Ĥ
EFFECT	SYS	SSOI	9)	1	1	Œ.
133	NNE	MUCNI	(2)	. 1	,	£
	PERSONNE	FIAES	9	•	ı	3
SHOOLGANA	FUNCTIONAL	PAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	b) K2  i) Open in the Coll-Lose of the Wind Velocity Signals Si,82 & Si in the Test Simu-lator Mode.	th) Pailure of the NO contacts to close upon actuation: A1,B1,C1(D1 not wired)-1.088 of the 51,S2,S3 Wind Velocity Signals in the Test Simulator Mode.	the NC contests the NC contests to close upon deactuation. A), B3,C3(D3) not wired)- Loss of the S1,82,83 Wind velocity
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1		
	ITEM		3	1.2		· · · · · · · · · · · · · · · · · · ·
				216 (A-	400)	

Mazard Leval, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Newiligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IV-Remote; E-Extremely Improbable;
F-Impressible) NOTE

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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				NAEC-91-7938	
	COMMENTS : RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	to assure the reliable passage of the low current Signals through (the contacts).	astrophic; II-Criticul; III-Marginal; 7V-Medigible) 'A-Fraquent: 9-Reasonably Probable; C-Oxosional; P-Romote; E-Extremely Improbable;
HAZARD	20	TTTTTHEADRY CVGFFILCCO	(12)		siligible donal, f
1	(T)	TYOTHESAD SVSJ OHANG)	(11)		C-Oxes
FAILURE	21 311	DETECTAE YE HOTARIGO	(01)		i-Marrotha Probable;
	NOI	POTENTIAL POSS	(6)		1, 111 bly 5
PECT ON:	MISSION	SSOI	æ		itical easona
	SYSTEM	DAMAGE	Ē		11-Cr
	SXS	SSOT	(9)		hic; xnent
	NNET	MUCNI	(2)		astrof
	PERSONNET	FIAES	3		.1 (I-Cat. 5.4.3.2
		PALLURE MODR (HAZARD RELEASE MECHANISM)	(3)		5.4.3. cara.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(3)	(cont'd) Relay 518915-1	Hazard Level, Column 11, per MIL-SID-882A, para. Hazard Probability, Column 12, cer MIL-SID-882A.
	ITEM	ġ	3	1 · · · · · · · · · · · · · · · · · · ·	NOTE: 15

217 (A-201)

(FATTIRE "ODES & FFECTS ANALYSIS - SYSIEM) SAFETY ANALYSIS MKL MOD O LSO-JUU CONSOLE SYSIEM

MAFC-91-7953

NAME: (Sub-system) SYNCHRO JUNCTION BOX

TABLE: UNIT 4A2

DMG. NO./REV.: 621187-1

Page 7 of 21

		91000		8	EFFECT ON:	S			FAILURE		HAZARD	
ITEM	ITEM DESCRIPTION	FUNCTIONAL	PERS	PERSONNEL	BYSTEM	$\vdash$	MISSION	١	Z71			SNOTTENDENDE STORMENDATIONS.
O	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	FIAES	MUCHI	SSOT	DAMAGE	SSOI	FOLENTIAL	DETECTAB BY ROTARIGO	ITADITICZAJO EVEL ONANAH)	TILITARDES SOURCES	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)
3	(3)	(3)	•	(2)	(9)	(2)	(8)	(6)	(10)	(11)	(11)	(13)
2:	(cont'd) Relay 518915-1	c) K3 i) Open in the Coil-Loss of the Wind Angle & Wind Velocity 819-nals R1,R2 & R2, R3, R3 in the Test Sisulator Mode.	1		<b>š</b> .		ı	1	Ψοχ.	II	Ú	Test check-out and adjustment problem. Repair is quick and easy.
		the No contracts to close upon actuation: All Bi, Cl, Dl-Loss of the Rl, R2 Wind Angle and R2, R1 Wind Velocity Signals in the Test Simula-	1	1	1	1	•	i		Ħ		Even though these failures would affect only the Test procedures, due to their high probability of occurrence, an improvement in the design is recommended. See below tree item 1.2.s.iii.
		111) Fallure of the WC contacts upon deactuation A3,83, C3,D3-Loss of the Mind Angle & Wind Velocity Signals, R1, R1 in the Ship's Input	8	8	3	<b>X</b>	8	3		1-11	•	DANGER! There is a certainty that the contacts after their tast in the 10Amp strong current, will not pass a weak current, even the 40 milliAmp is too weak! That means that the situa- tion as it is right now will not work!  • RECOMMENDATION: Introduce the necessary changes in the Design and procedures (test) to assure

Mezard Lowel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Nevilyible)
Mezard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Romote; E-Extromely Improbable;
F-Improbable;

218 (A-202)

CEALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS, MYL 701 C LSC-HUB CONSOLE SYSTEM

:NEC-01-7953

TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./RBV.: 621187-1

Page 6 of 21

			—,	NAEC-91-7958	_
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	the reliable passage of the low current Signals through (the contacts).	. (I-Catastrophic) II-Marginal, IV-Neyilgible)
HAZARD	æ	YTT TEASONS ENGBREECO	(21)		) ligible)
٠	<b>E 20</b>	TVOLTICZALD SVZI GYAZAH)	(11)		1; 1V-N6
FAILURE	ZI ZI	EATCETAL BY HOTAREGO	(10)		Margina
	MISSION	POTENTIAL LOSS	(6)		
	MIS	SSOI	(8)		Jtica
5	SYSTEM	DYMYCE	(7)		_ ; ;
KFFECT	1	SSOI	9		rhitor
Ā	PERSONNET	XHOCHI	(2)		astro
	PERC	FIAES	3		Cer
HA & ABROATS.	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	au )	, para. 5.4.3
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1	leazard Law.l, Column 11, per MIr-STD-862A,
	ITEM	ġ.	ε	1.2	NOTE: Ha

of 21

Page 9

CALLING MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MICH MON O LSO-MUD CONSOLE SYSTEM

UNIT 4A2 TABLE (Sub-system) SYNCHRO JUNCTION BOX

621187-1 HAR:

DMG. NO./REV. :

::VEC-01-7023

<u> </u>																														
	- SNOTE COMMODAG - SECTIONS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)		Test check-out problem.					Even though these failures would	affact only the Test procedures,	due to their high probability	in the design is recommended.	See below and item 1.2.a.iii.						DANGER! There is a certainty that	the contacts, after their test in	the 10Amp strong current, will not	page a weak current, even the 40	milliamp is too weak! That means		NOW WILL HOL WOLK!	• RECOMMENDATION: Introduce the	necessary changes in the design	the reliable passage of the low	Current Signals through (the
HAZARD	<b>3</b> 0	ENGENEUTOS ENGENEUTOS	(12)		υ					•										A-6										
1	63	TEADTHISSAED SV3.I GHASAH)	(11)		=======================================					111										11-1										
FAILURE	<b>3.1</b> (	DETECTAB BY SPERATOR	(10)		Yes					:																				
	ION	POTENTIAL LOSS	(6)		1					ı										æ										
	MISSION	SSOI	(8)		•					•										3										
Š	SYSTEM	DYMYCE	(7)		1					1										3										
EFFECT ON:	SYS	SSOI	(9)		1					•							٠			(×					_					
	NNET	XXOCNI	(2)							١										×										_
	PERSONNE	SZAIT	(4)		•					1										3										Hode.
	FUNCTIONAL	PAILURB HODB (HAZARD RELEASE MECHANISM)	(3)	d) K4	i) Open in the Coil-Loss of the SPH-42	True Air	Speed Sig- nale Sl, S2, S1	in the Test	Simulator Mode.	11) Pailure of	the NO con-	tacts to	close upon	81,C1 (D1 not	wired)-loss	of the SPN-44	\$1,52,83 In	the Test	Simulator Mode.	111) Failure of	the MC con-	tacts to	close upon	deactuation	Asias, called	not wired)-	ETH-44 TAS	Signale S1,	82,83 in the	Ship's Input Mode.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Melay 518915-1			•																							
	ITEM	Š	ε	1.2																										

MOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neuligible) contacte)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rassonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impresible)

220 (A-204)

THE RESIDENCE

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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<u> </u>	RES				NAEC-91-7958
	COMMENTS, RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	fast check-out problem.	Even though these failures would affect only the Test procedures due to their high probability of occurrence, an improvement in the dealgn is recommended. See below and item 1.2.a.iii.	DANCER! There is a certainty that the contacts, after their test in the long strong current, will not pass a weak current, even the 40 milliamp is too waak! That means that the situation as it is right now will not work!  • RECOMMENDATION: Introduce the necessary changes in the
MAZARD	PROBABILITY C	(13)	U	a	4-8
1 (	DINOFFISALD INVEL GRANNI)	(11)	pol pol pol pol	Ï	H
PAILURB	DETECTABI YE SANTOR:	(10)	8 ×	8 3 X	į
NOI	FORENTIAL STATES	(6)	1	•	8
NOISSIM	SSOI	(8)	•	1	3
ECT ON:	DYMYCE	(1)	1	1	<b>X</b>
	SSOT	(9)	•	•	(x)
R	MUCHI	(5)		1	(K)
SHE	SZAIT	Ξ		·	<u> </u>
HAZARDOUS-	FAILURE WODE (HAZARD RELEASE NECHANISM)	(3)	a) K5  1) Open in the Coll - Loss of the SPN-4 Closing Air Speed Signal SI,82,83 in the Test Simulation Mode.	the Mo contacts to close upon actuation:Al Bl,Cl (Dl not wired) - Loss of the SPN-4 CAS Signals Sl, Sl, Sl in the Test Sim ulator Mode.	111) Pailure of the (x) (x)  WC contacts  to close up- on deactua- tion: A3,B3, C3(D3 not wired)-Loss of the S89- 44 CAS S19- nals S1,S2, S3 in the SiMp's Input
ITEM DESCRIPTION	(COMPONENT, MODE OF OPENATION, PUNCTION)	(2)	(cont'd) Melay 518915-1		
ITEM	ý Ž	3	221 (A-20)		

Hazard Lowi, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; ID-Rymote; E-Extremely Improbable; F-Impressible)

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-IIUD CONSOLE SYSTEM

TABLE: UNIT 4A2

NAME:

(Sub-system) SYNCHRO JUNCTION BOX

621187-1 DMG. NO./REV.1

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NAEC-91-7958

	COMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		design and procedures (test) to assure the reliable passage of the low current Signals through (the contacts).	
HAZARD		TTTTTEVEDEC	(12)			
		PPOTIESALO SVSI OHANAH)	(11)			•
FAILURE	ET:	DETECTAB BY GOTARAGO	(10)			
	MISSION	POTENTIAL POTENTIAL	(6)			
	MIS	SSOI	9			
EFFECT ON	SYSTEM	DYWYCE	3			
FPEC	1	SSOI	9		•	
<b>"</b>	PERSONNE	YAUCNI	(2)			
	PEPS	TIAES	€			
- Sinodanaan	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	e) KS	9	
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1	•	
	ITEM	9	ε	1.2	2	222 (A~206)

NOTE: Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Roasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible;

#### (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-UUD CONSOLE SYSTEM HAEC-91-7958

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TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

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					NVEC-21-1339
. SMYTH KUNDUMANA OMNOMBANA.	COMPENSATION PROCUMENDATIONS) COMPENSATION PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Test check-out problem.	Even though these failures would affect only the Test procedures due to their high probability of occurrence, an improvement in the design is recommended. See below and item 1.2.s.iii.	DANGER: There is a certainty that the contacts after their test in the 10Amp etrong current, even the 40 milliAmp is too weak. That means that the situation as it is right now will not work!  A RECOMMENDATION: Introduce the necessary changes in the Design and procedures (test) to seare the reliable passage of the
HAZARD	TILITARORY EDMENNICO	(12)	v	а	8-4
. 0	DITADITICZALD IEVELI GRAZAH)	(11)			1-11
PAILURE H	DETECTABI YE SOTARION	(10)	į	<u>;</u>	•
30	TAITNETOT ESOLI	(6)	1	ı	3
MISSIM	SSOT	(B)	1	1	8
	DAMAGE	3	ı	1	8 .
EFFECT ON	SSOI	(9)	1	1	<u> </u>
REI	MOCKI	(2)	•	ı	3
ENECONNET	TIAES	3	1	•	X)
HAZARDOUS- FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	f) K6  1) Open in the Coil-Loss of the SPN-44 TAS Signal R2 and CAS Signal R1 the Test Sin ulator Mode.	the No contracts of the No contracts of close upon actuation: A1, B1(C1 & D1 not wired) -Loss of the SPH-44 CAS Signal R1 and /or TAS Signal R1 and the Tast Sim. Mode.	MC contacts  WC contacts  upon deactustion: A3,83 (C360) A0t  wired-loss  of the SPN-  44 CAS Sig-  mal M1 and/or  TAS Signal M2  to the Shi's Inout Mode
ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FUNCTION)	(3)	(cont'd) Relay 518915-1	·	
ITEM	ġ	ε	223 (A-2		

Hazard Level, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; IP-Manote; E-Extremely Improbable;
P-Ingressible; NOTE:

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(FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 4A2

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NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

MAEC-91-7958

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	COMMENTS RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		low current Signals through (the contacts).	
HAZARD		TILLEABORT ENGENIEM	(12)			
1	<b>10</b>	Trottissad Evel Geasah)	(11)			•
FAILURE	ZI ZI	DETECTAB BY OPERATOR	(10)			
	MISSION	POTENTIAL LOSS	(6)			
	MIS	SSOT	(8)			
EFFECT ON:	BYSTEM	DYMYCE	(7)			
FFEC	L_1	SSOI	9		-,	
PAS	PEPSONNET	INDOM	(2)			
	SHE	SZAIT	3			·
HATABOOIIG	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	f) K6	1111)	
	ITEM DESCRIPTION	OPBRATION, FUNCTION)	(2)	(cont'd) Relay 518915-1		
	ITEM	ğ	Ξ	1.2		224 (3-208)

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Tm-ysgilian NOTE

224 (A-208)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O 150-HUD CONSOLE SYSTEM

NAEC-91-7958

UNIT 4A2 TABLE (Sub-aystem) SYNCHRO JUNCTION BOX

MAME:

DMG. NO./REV.: 621187-1

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					<u>·</u>	NAEC-91-7958
	SHOTTS BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	Test check-out problem.	Even though these failures would affect only the test procedures due to their high probability of occurrence, an improvement in the design is recommended. See below and Item 1.2.s.iii.	DANGER! There is a certainty that the contacts, after their test in the 10Amp strong current, will not pass a weak current, even the 40 milliAmp is too weak! That means that the situa- tion as it is right now will not work!  • RECOMMENDATION: Introduce the necessary changes in the De- sign and procedures (test) to assure the reliable passage of the low current signals through (the contacts).
HAZARD		TTTEABORT	(11)	ပ	4	18 1 4
		eval orkani	(11)	ш	Ħ	H
FAILURE	371 371	ETTECTAL BY COTAREGO	(10)	<b>4</b> 0 × 0	***	<u>*</u>
	ION	POTENTIAL	(9)			3
	MISSION	SSOT	(8)	1	1	3
Š	TEM	DYWYGE	(7)	1	1	3
BPFECT	SYSTEM	SSOI	(y)	1	1	3
2	NNET	MUCNI	(2)	,	ł	3
	PERSONNEL	TIAES	3	ı	1	3
		FAILURB MODB (HAZARD RELEASE MECHANISM)	(3)	g) K7  1) Open in the Coil-Loss of the Deck Status Sig-nals in the Test Simula-tor Mode.	the ND contacts upon actuation: Al,Bl,Cl(Dl not wired)- Loss of the Deck Status Signals in the Test Simulator Mode.	the NC contacts to close upon deactuation. A), B3, C3(D3 not wired)- Loss of the corresponding Deck Status Signal (s) in the Ship's Input Mode.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1		
	ITEH	ġ	(3)	1.3		

NOTE: Mazard Laval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent: B-Peasonably Probable; C-Occasional; IP-Runote; E-Extremely Improbable;
F-Improsable)

225 (A-209)

of 21

15

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX

NAME:

DMG. NO./REV.: 621187-1

MAEC-91-2958

58						
		SHOLL SECTION SERVINGS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	This to a spare.	
	HAZARD	.ao	YTLIDEAEOFG EDMENNICCO	(13)		
	1 (	(E 20	TENSTITISALD EVEL OMASAH)	(11)		
	FAILURE	रा डा	EATDETEC YE ROTARETO	(10)		
		ION	ross bolentive	(6)		_
		MISSION	SSOI	(8)		
	ON	TEM	DYWYCE	(1)		_
	EFFECT ON:	SYSTEM	SSOI	(9)		_
		NNET	XXOCNI	(2)		_
		PERSONNET	SZAIT	€		_
	SIA S A DINOCIA.	Ī.	Fallure Mode (Harard Release Mechanism)	(3)	MOTE: The KB is a spare Relay, to be used when any of the seven "active" Relays would be failing and in need of replacement.  The KB Relay then would take place of that particular Relay, and its FMRA should be found under that one (page 3-14).	_
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Relay 518915-1	
		ITEM	Ŏ.	(1)	1.2	

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mayligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impresible)

NOTE:

White Die Brenn

226 (A-210)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

1

NAEC-91-7958

TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DWG. NO./REV.: 621187-1

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	<del></del>	-1		NAEC-91-7958
SNOTH TONGHNOOD STRAMOO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Periodic calibration and maintenance will keep the Component working within its intended limits.	This failure to occur within the short time after the check-out, during which time the function of this component is needed, is extremely improbable (in peacetime!).
HAZARD	ENGENEUTY (	(12)	<b>a</b>	14
1 (7	DINDTHISZAD BV31 OTASAH)	(11)	<b>1</b>	н
FAILURE E	DETECTAR BY NOTAREOR	(10)	d d	**************************************
NOI	POTENTIAL	(6)	1	8
MISSION	SSOI	(8)	1	8
TEM ON	DAMAGE	(1)	×	3
SYS	SSOT	(9)	c.	8
E PBREONNEI	KAUCNI	(2)	×	3
PBRC(	TIAES	3	•	3
HAZARDOUS- PUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) B1 friction inside of the Component will result in an increased insecuracy of adjustment and, therefore, increased insecuracy of the Wind Angle Signals Sig	ii) Mechanical bind (jam- aing) of the Rotor against the Stator will cause the Wind Angle Sig- nals Sig- nals Sig- in the in the majority of the 360 acale.
ITEM DESCRIPTION	(COMPONENT, MODE OF OPERATION, FUNCTION)	(2)	Synchro Differential Transmitter.  MIL-8-20708/22C-001.  Made by: Vernitron Control Components, San Diego, CA 92073 (contact)  Mon Campbell, Br. Sales Eng'r,  (714)-428-5581).  Vendor's P/M: VCDX15-6M2: Primary  Winding: Stator  Voltage: Primary  Frimary Current: 38mAmp, 60M1z.  Frour of these components are used  (81-84) in this Unit 42, to adjust the nulls for the Wind Angle, Wind  Velocity, SPM-44 True Air Speed and	Special State Special States and
ITEM	ğ	(1)	3	

Mazard fuvel, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Nayligible) Mazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impressible)

# (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX NAME:

DMG. NO./REV.: 621187-1

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	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	Periodic calibration and Maintenance will keep the Component working within its intended limits.	The probability of occurrence of this failure is extremely remote (in peacetime).  Also, the pilot has other channels to get accurate information on the Wind Velocity.
HAZARD	30 30	TTLLIEABORY	(112)	۵	M
1	(T)	ITADITIESAID EVEL GRASAH)	(11)	ii -	
FAILURE	I'E	DETECTAB BY OPERATOR	(10)	n 9	*
	MISSION	POTENTIAL POTENTIAL	(6)	1	8
	MIS	SSOI	(8)	1	3
NO NO	SYSTEM	35AMAG	(1)	×	3
EFFECT ON	L	SSOI	(9)		3
區	PERSONNEL	MUCNI	(2)	×	3
	PERS	TIAES	(4)	<b>~</b>	3
OH COM	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(٤)	1) Increased friction inside of the component will result in an increased insaccuracy of adjustment and, therefore, increased insaccuracy of the Wind velocity Signals SI, SZ,SJ.	Al) Mechanical bind (jam- ming) of the Rotor shainst the Stator will cause the Wind Velocity sig- nals Sl,S2, 83 to be grossly in- accurate.
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Synchro Differential Transmitter MIL-S-20708/22C-001	
	HELL	O	ε	£.1	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Roasonably Probable; C-Occasional; D-Romote; E-Extremely Improbable;
F-Impussible) NOTE:

228 (A-212)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.; 621187-1

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	_				NAEC-91-7958
	SNOTE ACMBINACO SENSINGO	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	Periodic calibration and Maint- enance will keep the Component working within its intended limits.	Extremely improbable to occur (in peacetime).  Also, the pilot has other channels/means to get information on accurate frue Air Speed.
HAZARD	æ	YTT.TTEASORY 3DM30NUCCO	(13)	<u>a</u>	M
١.	(Z)	TROTTIZAD EVSI GRAZAH)	(11)	<b>I</b>	M
FAILURE	ET.	DETECTAB BY ROTARIEO	(10)	<b>9</b> 0 2	<b>.</b>
	MISSION	POTENTIAL ESSI	(6)	<b>~</b>	3
	MIS	SSOT	(8)	1	8
S ON	SYSTEM	DAMAGE	(2)		3
EFFECT ON	<u></u>	SSOT	(9)	ı	3
G.	PERSONNEL	YNOUNI	(5)		3
	PERS	TIAES	(4)	ı	3
O I COM	FUNCTIONAL	PATLURE MODE (IIAZARD RELEASE MECHANISM)	(3)	1) Increased friction inside of the Component will result in an increased inscreased inside of the Component of adulatment and, therefore, increased increased interest of accuracy in the SPN-44 True Air Speed Signals Signals	11) Mechanical (x) (x) (x) (x) Yes I E bind (jumbind (jumbind) of the Rotor against the Stator will cause the Stator will cause the Stator True Air Speed Signals S.S. S. S. S. S. S. S. S. S. S. S. S. S
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	(cont'd) Synchro Differential Transmitter MIL-S-20708/22C-001	·
	ITEM	N	3	F:1	

Mazard Lavel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Fraquent; B-kassonably Probable; C-Occasional; P-Remote; E-Extremely Improbable; F-Investible)

Water and Work

229 (A-213)

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: UNIT 4A2

(Sub-system) SYNCHRO JUNCTION BOX

NAME:

DMG. NO./REV.: 621187-1

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The state of the s

58_					
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			(13)	Periodic calibration and Maintenance will keep the Component working within its intended limits.  Extremely improbable to occur (in peacetime).  Also, the pilot has other channels/means to get information on accurate True Air Speed.
UNGROUP	LEARE		YTLII8480RG DIGINNOOO	(12)	c <b>u</b>
	,	(T)	eval orasah)	(11)	H H
40111140	FAIL	21 371	DETECTAL BY OPERATOR	(10)	* * * * * * * * * * * * * * * * * * *
		MISSION	POTENTIAL POTENTIAL	(6)	(x)
		MIS	SSOT	(8)	(X)
		SYSTEM	DAMAGE	(2)	(x)
	EFFECT ON:		ross	(9)	(x)
	2	PEPEONNET	YAULNI	(2)	(x)
			TIAES	€	- (X)
	HAZAPHOTIS.	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	d) B4  friction in- eide of the Component will result in am in- creased in- accuracy of adjustment- and, there- fore, in- creased in- accuracy in the SPN-44 Closing Air Speed Signal 81,82,83.  Ai) Mechanical bind (jam- ming) of the Rotor agains the Stator will cause the SPN-44 Closing Air speed Signal 81,82,83.  in main Signal speed Signal shing of the Rotor agains the Stator will cause the Stator will cause the Stator will cause the Stator will cause the Stator speed Sig- nals Sigs, Si to be grossly inaccurate.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			(2)	Transmitter MIL-S-20708/12C-001
		ITEM	ģ	ε	c.

Hezard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Harginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
P. T. Proposition of the Probability of the Proposition of the Propo NOTE

230 (A-214)

#### (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

IAEC-91-7958

TABLE: UNIT 4A2

NAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.; 621187-1

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_					NAEC-91-7958
	SNOTH A CHARLES OF THE PARTY OF	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)		
HAZARD	æ	YTLLIAASORG	(12)	as Co	
	, K	ITANTIISAID EVAI OHANAH)	(11)	1 cared-for	•
FAILURE	1	DETECTAB BY OPERATOR	(10)	in A We	
	ION	FOTENTIAL LOSS	(6)	nent	
	MISSION	SSOI	(8)	Component	
NO SN:	SYSTEM	DYMYCE	(3)	this	
EFFECT	SYS	SSOT	(9)	vie .	
2	NE	YRUCHI	(2)	pate	
	PERSONNE	TIAES	3	antic pated	
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	No problems are antic	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Synchro Dial Assembly 518420-1. Four of these are used, one each to "tune" one Synchro Differential Transmitter.	Maker: Vemaline Products Div. of Ostby & Barton Co., Warwick, NI. Characteristics: . Zero backlash . Initial torque 15-20 oz. in Corrosion resistant . Ball driven planetary drive . # 1 minute accuracy . Withstands 100g shock in all planes/axes.
	ITEM	ġ	(1)	:	

Hazard Lavul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Nevilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 <sup>(A)</sup>-Proquent; B-Rassonably Probable; C-Occasional; D-Ramote; B-Extremely Improbable;
+-Improbable; NOTE

With the Mary

231 (A-215)

of 21

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(FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

TABLE: UNIT 4A2

MAME: (Sub-system) SYNCHRO JUNCTION BOX

DMG. NO./REV.: 621187-1

NAEC-91-2958

TERM   COMMENT, NOR OF   PARADOUS   PARADO	5										
ITEM DESCRIPTION FUNCTIONAL  (COMPONENT, MODE OF PAILTENAND FUNCTIONAL  (COMPONENT, MODE OF PAILTENAND FUNCTIONAL  (2)  (3)  (4)  (5)  (6)  (7)  (6)  (7)  (9)  (10)  (11)  (10)  (11)  (11)  (11)  (12)  (13)  (14)  (15)  (16)  (17)  (18)  (19)  (10)  (10)  (11)  (10)  (11)  (11)  (11)  (12)  (13)  (14)  (15)  (15)  (16)  (17)  (18)  (19)  (10)  (10)  (11)  (11)  (11)  (11)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (18)  (19)  (10)  (10)  (11)  (11)  (11)  (11)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (17)  (18)  (19)  (10)  (11)  (11)  (11)  (11)  (11)  (12)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (17)  (18)  (19)  (10)  (11)  (11)  (11)  (11)  (11)  (12)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (17)  (18)  (18)  (19)  (10)  (10)  (11)  (11)  (11)  (11)  (12)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (17)  (18)  (18)  (18)  (19)  (10)  (10)  (11)  (11)  (11)  (11)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (17)  (18)  (18)  (18)  (18)  (18)  (19)  (10)  (10)  (11)  (11)  (11)  (11)  (12)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (16)  (17)  (17)  (17)  (18)  (18)  (19)  (10)  (10)  (10)  (11)  (10)  (11)  (10)  (11)  (11)  (11)  (12)  (12)  (13)  (14)  (15)  (16)  (17)  (16)  (17)  (17)  (17)  (17)  (18)  (18)  (18)  (19)  (19)  (10)  (1			COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)						
ITEM DESCRIPTION   FUNCTION   FUNCTIONAL   PAILURE HODE		AZARD	æ	PROBABILLITY  PROBABILLITY	(12)			·		<b>1</b> -6	
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring		1	E 20	evali obasah) Evali obasah)	(11)		4	-out and		VI-111	
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring		FAILA	l	XΞ	(10)		4	ic chec	1	Yes	
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring			SION	POTENTIAL ESOJ	(6)			perio	2011		
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring			MIS	55071	(8)		4	the	, ,		
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring		r or	STEM	DYMYCE	(2)			t and			
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring		FFEC		ssor	(9)			PO	75.		·
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring		ഥ	ONNE	MULNI	(2)			chec	1		
TTEM DESCRIPTION (COMPONENT, MODE OF FIGURATION, FUNCTION) (III)  Connector J1 (MS17346R24C28S)  Terminal Boards TB1-TB6 Relay Socket M12883/21-01 (for Belays Kl-K8) Imaide wiring			SHE		3			peed.	e to		· <del></del>
		Silongaean	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)			connections have	maintenance pro accidental dama		
17 (C) 1.5 1.6 1.7 1.7 1.8 1.8 1.9 1.7 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9			ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Connector 31 (MS17346R24C2RS)	Terminal Boards TB1-TB6	Melay Socket M12683/21-01	(for Melays KI-K8)	Inside wiring	
			ITEM	ġ ¥	ε	1.5	1.6	1.7		1.0	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Impossible) MOTE

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232 (A-216)

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(10000)

#### FAILURE MODES & FFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O 150-1100 CONSOLE SYSTEM

TABLE: UNIT 4A3

NAME:

(Sub-aystem) MOVLAS-HUD INTERFACE ELECTRONICS BOX

NO./REV.: 620522-1 (Schematic: 620528) (Wiring: 620529)

II/AEC-91-7958

of

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Page

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) 443 (13) res lamp driver mini-HOVIAS mbly installed on it. er for its using tl ransfor (13) **ENGINE** HAZARD TILITANDIA embly by ne an auxiliary fuse holder ass NE MOVIA (11) (HAZAH) box (Unit 2). MOLEVOLLICSAL FAILURE cage as **SECRATORS** 90 olate BX card t and onics dontai TVILLINI 6 MISSION 1191 lecti trica (8) contains a SSOT ver monitor elec ð 3 SYSTEM uxillary DYWYCE EFFECT Dard. (2) SSOT 8 display on the HUD consola to allow independent intens ty control display on the HUD consola to allow independent strength to circuit boards, one power supply beard, and an extender circuit to the result boards and the frost panel has a power switch, po tron the ERSONNEI (2) ? INDOK from 9 ğ Ξ 4 TIAES FAILURE MODE (HAZARD RELEASE MECHANISM) s Box contains buff he electronics come **FUNCTIONAL** HAZARDOUS-E display on the HUD console to allow 115VAC, 1# 60 Hz power to operate copy of the Schematic Reduced copy of the Schemat Diagram 620528 is at right. (COMPONENT, MODE OF OPERATION, FUNCTION) ITEM DESCRIPTION (2) This page 13 best quality practicary FROM COPY FUENISHED TO DOC ITEM 3 1.0 Š

NOTE

W was all story

(A-Prequent; 9-Roosovably Probable; C-Occasional; D-Newote; E-Extremely Improbable; (I-Catastrophic, II-Critical, III-Marginal, IV-Neyligible) F-Impressible) Hazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Cat Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2

233 (A-217)

# (FAILURE MODES & FEECUS ANALYSIS - SYSIEM) SAFITY ANALYSIS "KI MOD O 150-HUD CONSOLE SYSIEM

KATC-111-7958

TABLE: UNIT 4A3

NAME:

(Sub-system) MOVIAS-HUD INTERFACE ELECTRONICS BOX

DMG. NO./REV.: 620522-1 (Schematic: 620528)

Page 2 of 3

		ŵ	-	
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS)			The probability of the Fuse to burn out just in the moment of an aircraft approaching the landing strip and the Pilot depending only on the MOVIAS is extremely remote.
HAZARD	30	YTLITEABORY SOMBREDCO	(11)	žų.
1	20	TEADTHISSAID BV3.I ORANAH)	(11)	H
FAILURE	21 371	DETECTAB BY ROTARAGO	(10)	Yes
	MISSION	POTENTIAL SEOJ	6	8
	MIS	SSOT	(8)	(x)
8	SYSTEM	DYMYCE	3	(x)
EFFECT	1	SS01	(9)	(x)
<u> </u>	PERSONNET	Injura	(2)	8
	PERS	TIAES	3	8
	FUNCTIONAL	FAILURE MODE (INZARD RELEASE MECHANISM)	(3)	One of the two that will interrupt the aberracal power feeding the unit 4A1, and that will extinguish the world slights and their correspondin "monitors" on the inub Console (on the left side of the iSO).  It will also be seen on the Unit 4A3 itself: the Power Monitor Light XDS-1 will also go off.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Fuse F03A250V4AS, two used, one in each of the two Transformer's Primary Winding feed lines of the liSVAC.
	ITEN NO.			

Hazard Levul, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Harginal; IV-Neyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; F-Introcalible MOTE

Water Bullion

234 (A-218)

(FAILURE L'ODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MYL MOD O 150-HUD CONSOLE SYSTEM

MAEC-91-7953

TABLE: UNIT 4A3

NAME: (Sub-system) MOVLAS-HUD INTERFACE RIECTRONICS BOX

DMG. NO./REV.: 620522-1

Page 3 of 3

	_							N N	AEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)	(E1)	• RECOMMENDATION: Include the necessary instruction (to observe the Power Monitor Light and switch off the Power Switch) for the Naintenance personnel before they would start working on this Unit 4A3.	winding and thus to cause -out principles have been				
HAZARD		PROBABILITY COUNTRING	(12)	a	and thu	P-8	4		14
•	(T	madtherad eval grasari	î	111-11	to fall (open winding)	111	ind and		
FAILURE	ري التا	IATOSTEG YS IOTARSTO	(10)	8 8 X	1 (open	vity.	n a properly operated and		Yea Yea
701	5	IOSS FOLENTIAL	6)	•	to fa		roper		
MATGETAN	Z I	SSOT	9	1		Ψ.	4		4 at
ECT ON:	TEM	DAMAGE	3	ж	component errunted.	Ę,	Prd		100
BPFECT ON	2 20	SSOT	9	•			. Pie		
38	NNE	XXOCNI	(2)	н	for	8			for the
B	PERSO	TIAES	(3)	ı	reseen for this	erformed before	rosee: in		
HAZARDOUS-	FUNCTIONAL	PAILURE MODE (HATARD RELEASE MECHANISM)	(3)	In case the Lamp burns out, the Power Monitor Light is "off" even If the switch is "on" - this can cause safety hazard to the personnel who might start working in- side of the Unit And believing the Power is off.	No problem is feresee the function of the U		No problem is formal maintained System		Mo problem is foreservell-maintained Syste
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Power Monitor Light, one Lamp M15098/11-001, Provides infor- mation to the personnel that the Power Switch on the Unit 4A3 is switched "on" (the light is "on").	Transformer 620522-2		A4 Power Supply Card 518937-1 provides the DC power for:	. the Lamps (V <sub>lamp</sub> = 7VDC nom.) . the Al cards (V <sub>G</sub> =12VDC <u>+</u> .5VDC) . the "Ref" for Al Cards (V <sub>REF</sub> =7.5VDC ±5*)	Comparator lamp Driver Card 518932-1 (Al, A2 & A3), Schematic Diagram: 518931.	
ITEM	•	ġ	(E)	2.1	1.3		7.		s.

Mazard Lowi, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Harginal; TV-Nexilgible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Oxcasional; D-Remote: E-Extremely Improbable;
F-Impressible) MOTE

235 (A-219)

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of

Page

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O 150-HUD CONSOLE SYSTEM

MEC-91-7958 TEST SIMULATOR INTERFACE BOX (Sub-system) TIM5 TABLE NAME

DMG. NO./REV.: 621189-1

COMPENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES PLAT SYS. CANT (AA4) ( 600 to 16 16 To UP DISPLAY CONSOLE SAFETY CONTROLS) (13)135 HEADS UP DISPLAY HEADS 100 m (17) **ENERGENE** HAZARD AUXILIARY PERCENTING THE STATE OF (Direction) (11) (HAZARD LEVEL) FAILURE S'WIND OR & VEL. **OPERATOR?** (10) DETECTABLE BY D. M. C. Milled FIGHTHAN) FORE TORS 6 MISSION SSOT 8 ₹ SYSTEM E DAMAGE 훕 testing. RFFECT S SSOI Matok BRSONNEI at simulato stati 2 THUCKI WOER 3 calibrate the display TIAES to operate the te the LSO HAZARD RELEASE he KUD console for FUNCTIONAL FAILURE MODE HAZARDOUS-MECHANISM) 3 located in from the location of the HUD conso of the Unit 4A4 to all other units of the System and to the Test Simulator (which at one time was means to connect the simulator to It allows one man to troubleshoot right to see the interconnections The Test Simulator Interface Built provides 115 VAC, 60 Hz, 19 to the Block Diagram at (COMPONENT, MODE OF OPERATION, FUNCTION) ITEM DESCRIPTION 3 called "Unit 5"). Refer ( ITEM 3 1.0 Š

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyligible) Hazard Probability, Column 12, por MIL-STD-882A, para. 5.4.3.2 (A-Freguent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable; DISPLAY SUBSYSTEM MINI MODOLES THUD TONSOLE T F-Immestible) MOTE:

115 VAC V 1460 HZ 15 A (2 CIRCUITS)

1444611

A PARTIE

Was .

UNITGAE NA HUD MOLAS I WYERFACE CLECTRONICS

133%

LITA,

WATE TYPE DES

13/ SPN-44 A/B

OR min 144

236 (A-220)

(EALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MICHARD CONSOLE SYSTEM

"NEC-91-7458\_

A PARTY OF

The same of

TABLE: UNIT 4A4

MB: (Sub-system) TEST SIMULATOR INTERFACE BOX

DMG. NO./REV.: 621189-1

Page 2 of 2

								NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)		nections," no problems are foreseen once the ne and maintenance operations are carried out.	into the t water) will	However, the	
HAZARD		TTLIDEASORY DESPENDENCE	(11)		foreseer	Cables the sal	dition, . Howev	
	(T	TUCHTISAND SVSI OSANGI)	(11)		operatio	wlator's icularly	oyed cor a battle	
PAILURE	271 271	DETECTAB BY COFRATOR	(01)		no prob eme are tenance operatio	ne connectors of the Test Sigulator's uch a way that he waser (particularly	Console in the deployed condition, an enemy a tack in a battle. Howev	
	ION	POTENTIAL POTENTIAL	(6)	-	nections," ns and main	f the	le in	
	MISSION	SSOI	(8)		necti ne en	ors o that	Conso	
NO :	SYSTEM	DYWYCE	(2)		ectic	nnect	auo ring to.	
EFFECT ON:		SSOT	(9)		· · · · ·		the the constant	
ă	PERSONNET	YNUCHI	(5)		"ha	fu l	that	
	PERSC	TIAES	(4)		e only		, as e cas into	
-SDOJENSKI	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)	·	of this Box there are only "harked-out, provided the periodi	matings and unmatings of Unit 4A4 will be performs kets.	i that this Unit 4A, as lying objects" as the cas not permit us to go into	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	NOTES	<ol> <li>Considering that inside b Box is installed and check</li> </ol>	2) It is expected that the m five Receptacles on the in contaminate the pins/sock	3) It should be born in mind that this Unit 4A protected against the "flying objects" as the acope of this work does not permit us to go	
	ITEM		3	1.1			· / a 2 2 1 1	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Realigible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IN-Remote; E-Extremely Improbable;
F-Improbable;

237 (A-221)

of B

Page 1

The state of the s

#### (FAILURE MODES & FFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-1800 CONSOLE SYSTEM

UAEC-91-7958 (Sub-ayatem) INTERCONNECTING CABLES TABLE: CABLES NAME:

DMG. NO./REV.: 621145

<u> </u>				
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)		(13)	HEADS UP DISPLAY  HEADS UP DIN
HAZARD		PROBABILLITY PROBABILITY	(12)	HE ADS
1		DINCHIESAD BV31 OHANH)	(11)	SON PARTY OF THE P
FAILURE	1	DETECTAB BY ROTAREO	(10)	
	ĕ	POTENTIAL	(6)	TO HOLD THE PROPERTY OF THE PR
	MISSION	SSOI	(8)	ATTEN ON THE PROPERTY OF THE P
Š	TEH	SDAMAG	(7)	
EFFECT	SYSTEM	SSOI	(9)	
i ii	NNET	MUCNI	(2)	
	PERSONNET	SZAIT	€	
	HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(3)	The Interconnecting Cables, W220 through W245, provide the interconnections among the Ship and individual Units of the HUD Consols System.  Refer to the sketch at right, in which the 26 cables have been marked in the "Display Subsystem" block diagram.
	ITEM	Š	Ξ	0.1
				238 (A-222)

NOTE: Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Augligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Oscasional; D-Romote; E-Extremely Improbable;
F-Turnesible)

# (FALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

TABLE: CABLES

NAME: (Sub-system) INTERCONNECTING CABLES

DMG. NO./REV.: 621145

Page 2 of 8

						NAEC	-91-7958
	COMMENTS - RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)		Mone of these failures would represent a problem. Besides, the periodic check-out and maint-	enance procedures will diminiah greatly the probability of these failures to occur.	
HAZARD	O£.	PROBABILITY SOCURBENCE	(12)		948	15	a
•	) (1)	IVOTTISSAD SVEL OKANH)	(11)	E	=======================================	H	Ë
PAILURE	्र इस्	EATCETEC YE ROTARETO	(01)	e c ×	•	į	•
	ION	POTENTIAL ROSS	(6)	ı	•	1	1
	MISSION	SSOT	(8)	1	ı	1	1
8	SYSTEM	DAMAGE	(7)	1	1	ı	1
RPPECT ON:	SYS	SSOI	(6)	1	1	1	1 .
22	MNEL	MOCNI	(5)	1	ı	1	1
	PERSONNEL	FIAES	€	1	ı	1	ı
-SINOGA 64H	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) An "open" in any of the 23 wires or con- nections ("Lamps' Sig- nals") - Loss of the correspon- ding light on the Hinl-MOVIAS on the HUD Con- sole.	b) An "oyen" in the +5VDC ra- turr line - Loss of all the lights on the Mini-MOVLAS.	tween any two of the 23 "Lamp" wires- The corres- ponding two lights will be on, instead of	d) A "short" be- tween any of the 23 "Lamp" wires and the ground-loss of the correspon- ding light.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Cable W220 (MOVIAS), carries the 23 Lampe' Signals (L1-L23) and the +5VDC return from Unit 1, Connector 31 (MOVIAS) to Unit 483, Connector 33.			
	ITEM		(1)	r.			

Hazard Lovel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; IP-Remote; B-Extremely Improbable;
F-Impressible; NOTE:

239 (A-223)

VEALLURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-IND CONSOLE SYSTEM

TABLE: CABLES

NAME: (Sub-system) INTERCONNECTING CABLES

DWG. NO./REV.: 621145

Page 3 of 8

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			Mone of these failures would represent a problem. Besides, the periodic check-out and maintenance procedures will diminish greatly the probability of these failures to occur.	Even though it is considered an extremely improbable altuation, yet, because of the sarious consequence it would create, the following is offered:  • RECOMMENDATION: Route the two pairs of Wave-off Signals through two different Cables.	The poriodic check-out and maintenance procedures will keep the Cable in good working order. Once checked out before the operation, it is not expected that the Cable would suffer any damage (in peace time!).	There are redundant channels of communication available.
		(12)	w	M .	Δ	ပ
10 (1)	TROTTISALD SVEL GRASAH)	(11)	Ħ	M	<b>H</b>	111
27 371	DETECTAB BY COPERATOR	(10)	Yes	***	•	¥ es
SION	POTENTIAL LOSS	(6)	1	×	3	ı
MIS	SSOT	(8)	1	×	3	1
TEM	DYMYCE	(7)	•	×	8	t
	SSOI	(2)	1	×	3	1
MINE	MUCKI	(2)	1	×	<b>X</b>	ı
PERS	TIAES	€	•	×	3	1
FUNCTIONAL	FAILURB MODB (HAZARD RELEASE MECHANISM)	(3)	a) A "short" of the +5VDC return and ground - Loss of all the lights.	An open in the LSO Wave-off or its return and in the ACIS Wave-off or its return will cause the loss of the Wave-off function.	An open in the wires carrying Ship's AC and the Main AC power will result in the loss of the System's function.	An open in a wire or connection - loss of that particular func- tion of the System
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd) Cable W220	Cable W221 carries the Aircraft Designation and Wave-off signals from Unit 1, Connector 32, to Unit 4A1, Connector 32.  Note: In the column 3, only important modes will be stated to avoid unnecessary length of the report.	Cable W222 carries the AC/AC (Fower/Control) from Unit 1, Connector J3 to Unit 2, Connector J2.	Cable W223 carries the DC power from Unit 1, Connector 34 to Unit 2, Connector 31.
ITEH NO.		(1)	1	, T	<u>:</u>	1.4
	ITEM DESCRIPTION FUNCTIONAL PERSONNET SYSTEM MISSION M 2 2 3 8	ITEM DESCRIPTION  (COMPONENT, MODE OF  FUNCTIONAL  (CAMPONENT, MODE OF  FAILURE MODE OF  (HAZARO RELEASE  LOSS  (HAZARO RELEASE  LOSS  (HAZARO RELEASE  LOSS  (HAZARO RELEASE  LOSS  (HAZARO LEVEL)	ITEM DESCRIPTION  COMPONENT, HODE OF  FAILURE HODE  (CAMPONENT, HODE OF  FAILURE HODE  (HAZARD RELEASE  HECHANISH)  HECHANISH)  (A) (5) (7) (8) (9) (10) (11)	COMPONENT, MODE OF FAILURE HODE  (COMPONENT, MODE OF FAILURE HODE  (COMPONENT, MODE OF FAILURE HODE  (COMPONENT, MODE OF FAILURE HODE  (HAZARD RELEASE  (HAZARD RELEASE  (A) (A) (B) (C) (T) (B) (C) (T) (B) (C) (T) (B) (C) (T) (B) (C) (T) (T) (T) (T) (T) (T) (T) (T) (T) (T	(COMPONENT, MODE OF PAILUNE HODE (COMPURED TOWN FUNCTION)  (COMPURED TOWN FUNCTION)  (COMPUSED TOWN FUN	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Criticul; III-Marginal; IV-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Impossible; NOTE:

240 (A-224)

# (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

LE: CABLES

(Sub-system) INTERCONNECTING CABLES

NAME: (Sub-system) intercondage No./REV.: 621145

Page 4 of 8

•	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)			The Hazard classification will depend on the need of the FLAT function: in good weather daylight, it could be as unimportant as a III, but at night or bad weather, it could easily be a III.	The Inter-Communication System is a redundant channel of communication between the LSO and (PRY FLX) Pilot.	The lost signals are amongst the redundant information arrangement. It would take all redundant branches	to fail to cause a problem.		The periodic check-out and maintenance procedures will assure this Cable to be	functioning when needed.
HAZARD	a)	TTLLIEAEOAT EDMEMBIUDDO	(12)	۵	۵	۵	<u> </u>		۵	a
1	<b>6 7 9</b>	TLASIFICALD SV31 GRASAH)	(11)	111-111	111	111	i		=	111-(1)
PATLURE	371 371	DETECTAB BY ROTARIEO	(10)	X es	8 O X	e e >	į		<b>8</b> 0 ×	Yes
	MISSION	POTENTIAL POTENTIAL	(6)	3	1	æ	×		ı	(X)
	MIS	SSOI	(8)	3		3	3		ı	æ
EFFECT ON:	SYSTEM	DAMAGE	(2)	3	1	3	3		×	(x)
FFEC		SSOT	(2)	8	1	3	3		ı	3
	PERCONNE	XXOCNI	(2)	3	1	3	3		×	(x)
_	PBR	SZAIT	3	3	l	3	3		'	3
	FUNCTIONAL	Pailure mode (Hazard Release Mechanism)	(E)	An open in the Wire or connection would cause a loss of the FLAT function.	An open in the Wires or connect- ions will cause the loss of the 21MC System.	An open in the Wires or connections will cause an error in the corresponding signal that it carries.	An open in the Wires or connections will cause a loss of the corresponding signal.	An open in the Wires or connect- ions will cause a loss of:	. Obstruction Light	. Pedestal Light Switch
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Cable W224 carries FLAT (Filot Landing Aid Television) Signals from Unit 1, JS to the PLAT System.	Cable M225 carries the 21MC inter- Communication System Signals from Unit 1, 36 to the 21MC System.	Cable W226 carries the Wind (Angle & Velocity) and SPN-44 True Air Speed (TAS) and Closing Air Speed (CAS) Signals from Unit 1, J7 to Unit 4A2, J1.	Cable W227 carries the Ramp Motton, Trim, SPN-42: T.A.S. & C.A.S., Bate of Descent, Alt. Error, Lat. Error and Range Signals from Unit 1, 38 to Unit 4A1, 31.	Cable W228 carries the Obstruction Light and the Pedestal Switch current from the Unit 2 to the Unit 3A4.		
	ITEM NO.		(1)	7:5	9:	1.7	9.	6	=	

Mazard Lewel, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catustrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Intracible) NOTE:

241 (A-225)

# CFAILURE MODES & FFEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MYL MOD O LSO-IND CONSOLE SYSTEM

::AEC-91-7953

CABLES TABLE:

(Sub-system) INTERCONNECTING CABLES

DMG. NO./REV.: 621145 NAME:

of B Page 5

	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)		(13)	The detection and the repair is quick (the DSI Light on the Unit 4A3) and easy (replace the Cable), which would take place at/during the periodic checkout procedure.	Since the NUD System is an additional help to provide a save approach and arrest of the Aircraft on the A/C, this failure would cause a serious problem only if the Pilot had to depend on it only.	However, the periodic inspections and maintenance will keep this Cable functioning.  RECOMMENDATION: Evaluate a possible redundant provision of power, and if it proves viable and advantageous, provide such design change.	Unless there is another arrangement to indicate to the Pilot that there is an obstacle on the runway, a redundancy should be arranged to assure the safety of the pilot.
HAZARD		PROBABILITY PROBABILITY	(12)	Q	۵	, .	۵
١,	100 E130	TYPOTTIZZAD SV31 ORASAH)	(11)	111-(1)	111-(1)		н
FAILURE	i	DETECTAB YE YOTAREGO	(10)	Z S	e		, ,
	NOI	POTENTIAL LOSS	6)	×	3		3
	MISSION	SSOI	(8)	3	3		×
NO T	SYSTEM	DAMAGE	(2)	3	<u>×</u>		3
EFFECT ON	L	SSOI	(9)	3	3		8
100	PERSONNE	ENJOYS	(2)	3	3		×
	PERS	FIAES	3	3	3		×
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	An open in the Wires or connections will cause a loss of the Unit 4A3 function (HUD-MOVLAS)	An open in the Wires or connections will render the HUD System inoperative.		An open in the "Foul" or the "Common" wire will cause a loss in the "Foul" Signal.
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)			Cable W229 carries the llSVAC power from Unit 2, J5 to Unit 4A3, J3.	Cable W230 carries the Ship's power to the Unit 2, J3, and to the System.		Cable W231 carries the Deck Statum Signals between Unit 2, TB4 and Unit 4A2, TB3 & 6.
	ITEM NO.			1.10	₹ 242 (A-226)		1.13

NOTE: Hazard Level, Column II, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Renote; E-Extremely Improbable;
F-Impropriet (A-Frequent)

VILLE DUNG

## (FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: CABLES

(Sub-system) INTERCONNECTING CABLES

DMG. NO./REV. ( 621145

HAVE:

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	COMMENTS RECOMMENDATIONS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	No real problem.	There are other means	pilot to guide him down.		e RECOMMENDATION: If there is no redundancy in the warning arrangement, it is recommended to provide for it.	This would represent a loss of one of redundant paths of information available to the pliot.
HAZARD		POBABILITY C	(12)	<b>a</b>	94	a	٩	۵	۵
١.	E 50	TIMOTTIEZAID EVEL GEASAH)	(E)	111	111-(11)	111-(1)	· ·	11-11	111-(1)
FAILURE	27 271	DETECTAR BY OPERATOR	(10)	Yes	Xes	# O Z	¥ o	ķ	•
	MISSION	POTENTIAL POTENTIAL	(6)	t	(X)	3	3	3	3
	MIS	SSOI	(8)	1	(x)	3	3	3	3
8	SYSTEM	DYWYCE	(1)	1	3	3	3	3	ı
EFFECT ON		SSOT	(9)	ı	3	3	8	3	•
M	NNE	ENUCHI	(5)	ı	3	8	8	×	3
	PERSONNEL	TIAES	3	•	3	3	3	я	3
- Sipodo a sen	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	1) An open in any of the 23 "Lamps" wires - Loss of one Light.	ii) An open in the return wire.	An open in any of the wires will cause an error in the Wind Angle or Wind Velocity dis- play.	An open in any of the wires will cause an error or lose of the SPN-44 TAS or CAS displays.	An open in the "Common" or "Foul" wire will cause the loss of the warning.	1) An open in the Signal Wires will cause the loss of that
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Cable W232 carries the 23 Lamps and thair return Signals from the MOVIAS box A1200 to Unit 4A3.		Cable W333 carries the Wind (Angle 6 Velocity) Signals from the Unit 4A2 to the Ship's Wind (Angle 6 Velocity) Synchros (or vice versa).	Cable W234 carries the SPW-44 TAS 6 CAS Signals from Unit 4A2 to SPW-44 (or vice versa).	Cable W235 carries the Deck Status ("clear", "Common", "Foul") Signals from Unit 4A2, T83 to the Control Box (ship's).	Cable W336 carries the SPN-42 Signals (ACLS Lock-on, Mode I, II, III, 6 ACLS Wave-off) thair return from Unit 4Al, to SPN-42.
	ITEM	<u>ş</u>	ε	1.13			1.15	1.16	1.17

Mazard Level, Colum, 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hizlid Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Remote; E-Extremely Improbable;
F-Impressible) NOTE

Walt be Way.

243 (A-227)

NAEC-91-7958

(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOD O LSO-MUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: CABLES

(Sub-system) INTERCONNECTING CABLES

DMG. NO./REV.: 621145

HAME:

of 8 Page 7

		HAZARDOUS-		<b>1</b>	EFFECT	_ ⊦			FAILURE	- 1	HAZARD		
ITEM	ITEM DESCRIPTION	FUNCTIONAL	PERS	PERSONNEL	SYSTEM		MISSION	_	28	(T)		COMMENTS; RECOMMENDATIONS;	.=
0	OPERATION, FUNCTION)	FAILURE MODE (HAZARD RELEASE MECHANISM)	TIAES	Injury	SSOI	DAMAGE	SSOT	DETECTAL  DETECTAL	DETECTAI BY OPERATOI	evali orazah)	PROBABILLITY OCCURRENCE	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	<b>99</b>
ε	(2)	(3)	3	(2)	(9)	3	9	(6)	(10)	(11)	(12)	(13)	ĺ
1.17	(cont'd) Cable W236	the return wire will cause the loss of all the Signals carried by the Cable W236.	<b>(</b> X)	(x)	1	t	8	X		111-(1)	N	This would represent a loss of one of the redundant paths of information available to the pilot.	•
1.16	Cable W237 carries the Signals LSO Mave-off and its return.	An open in either wire will cause the loss of the LSO Wave-off Signal.	<b>E</b>	3	3	3	3	<u>.</u> 3		111-(1)	۰ .		
1.19	Cable W238 carries the Signals of Ramp Motion and Trim and their returns from Unit 4A1 to FLOKS (Harmonization Computer).	An open in a wire will cause the loss of the corresponding Signal (Ramp Motion or Trim).	æ	3	3	3	8	3		111-(1)	۵		
1.20	Cable W239 carries the Signals of SPN-42 (TAS, CAS, Rate of Descent, Alt. Brror, Lat. Error, Range) and their returns from 4Alto SPN-42.	An open in a wire will cause the loss of the corresponding Signal.	8	3	2	3	3	× ×		111-(1)	۵	There are other paths of information available.	
1.21	Cable W240 carries the Signals of the Aircraft Designations from the Cross Check J-B to 4A1.	An open in a wire will cause a loss of one AC Designa- tion Signal.	•	ı	1	1	1		<u>;</u>	II.	٩		

Hazard Level, Column 11, per HIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per HIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
ons!

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(FAILURE MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

**IIAEC-91-7958** 

CABLES TABLE: (Sub-system) INTERCONNECTING CABLES NAME:

DMG. NO./REV.: 621145

8 Jo. Page B

	COMMENTS! RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	Test condition problem only.	5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Neyllgible) para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Renote; E-Extremely Improbable; F-Introphic)
HAZARD	_	PROBABILITY CCURRENCE	(12)	<u>a</u>	gligible ional; D
	(T)	TLOTTISZAJO ZVZI (MASAH)	(11)		il, IV-Ne C-Occas
FAILURE	371 371	EATCETEC YE ROTAREGO	(10)	•	-Margina Probable:
	MISSION	POTENTIAL POSS	(6)	1	ti ti
	MIS	SSOT	(8)	1	ritica
8	SYSTEM	DAMAGE	3		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
BPPECT	$\sqcup$	5501	9		atrophic, II-A-Frequent, B
M	PERSONNEL	XMUCNI	(5)	,	astro (A-Fr
	PERS(	SZAIT	Ξ	•	1-Cat
0110004	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	An open in a vira in these cables vill cruse the loss c. that particular 'unction in the Test Simulator Hode.	
	ITEM DESCRIPTION	(COMPUNENT, MOUE OF OPERATION, FUNCTION)	(2)	Cable #242 Cable #243 Cable #244 Power Cable #245 Cable #245	Hazard Level, Column 11, per MIL-STD-802A, para. Hazard Probability, Column 12, pur MIL-STD-802A,
	ITEM		ε	1.2 2 2 2 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2	NOTE: 112

245 (A-229)

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of

NEEC-91-7958

NAME: (Sub-system) TEST BIMULATOR ASS'Y

UNIT 5

TABLE:

NO./REV. 1 620598

ITEM

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1.0

COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES COMMENTS; RECOMMENDATIONS; SAFETY CONTROLS) **ENGENIE** HAZARD SO TILLIAMEDRY (HAZARD LEVEL) FAILURE -**SECRATORS** (10)DETECTABLE BY LOSS POTENTIAL 6 MISSION 8 E EFFECT ON SYSTEM DYMYCE 3 SSOT 3 DYDCKI Ξ **TIAE2** FAILURE MODE (HAZARD RELEASE PUNCT I ONAL MECHANISM) 3 (COMPONENT, MODE OF OPERATION, FUNCTION) ITEM DESCRIPTION (2) DESCRIPTION

The simulator (see Fig. 1) is a portable calibration and test device that synthesizes Signal and Synchro Junction Box inputs to calibrate the corresponding console displays or isolate a problem. The output signals incorporated in this simulator test box can be used to test the LSO Console operation without the SPN-42 ACLS system or other ship's source outputs. The simulator can be used to test all display console displays (except PLAT monitor) in place or in the shop. The potentiometer controls, toggle switches and rotary switches permit checking of the functions as indicated on the simulator box.

The simulator is self-contained. It only requires 115V AC 60Hz to operate. It contains DC power supplies to generate the required output signals and a digital voltmeter to indicate the required level of output for each check point. Check point voltage data is available on each electronic drawing corresponding to the display or scale being tested. The potentiometers on the box permit adjustment of the voltage to the circuit under test to cover the full operating range for analog input voltage signals.

Operation with the simulator causes the relays in the Signal Junction Box to energize, transferring input signals from the normal ship's source to the simulator input signals. This permits testing of the console operation by one person with the simulator at the LSO platform.

A standard 115V 60Hz test synchro is used to test the displays driven by the ship's synchro output. The test synchro is a three line (S1, S2, S3) unit having 115V, 60Hz two line (R1, R2) reference input with a 0° to 360° dial at its end to adjust the output related to degree rotation. The S1, S2, S3 and reference signals are applied to the synchro junction box through relays which are closed for the test synchro inputs and open for normal operation from the ship's input synchro information.

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Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;

NOTE:

William Deliver

246 (A-230)

(FALLWRE MODES & EFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MAL MOD O LSO-HUD CONSOLE SYSTEM

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(Sub-system) TEST SIMULATOR ASS'Y UNIT 5 TABLE

620298 DWG. NO./REV.: NAME:

Page 2 of 24

TTEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)  The following is  The following is	PECT ON:	PERSONNEI SYSTEM MISSION E S OF S	HAZARD RELEASE  (HAZARD RELEASE  LOSS  LOS	(3) (4) (5) (5) (7) (8) (9) (10) (11) (12) (13)	a achimatic of the test (amila or c routry.		CONTINUES IN	
		ITEM DESCRIPTION (COMPONENT, MODE OF	OPERATION, FUNCTION)	(2)	•			

William Hallow

(FAILING MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MOD O LSO-HUD CONSOLE SYSTEM

COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS) COMMENTS; RECOMMENDATIONS; 74 jo The same of the sa (13) 16.17 ( ) (17) **ENGENTION** HAZARD TITIES OF "INEC-11-7953 (11) (HAZARD LEVEL) ı NOLIVOLIUSVI FAILURE -61 BAIVON **CROTAR340** (10) SIBATDETES PE POTENTIAL 9 MISSION (8) SSOT PHEITAL DC VOLT METER (MI) Ē 3 SYSTEM DYMYCE RFFECT 3 5507 :010 BREONNEL (2) INJUEX 2 2 1 E \$ ( i i i Ξ TIAES FUNCTIONAL PAILURE MODE (HAZARD RELEASE MECHANISM) 921129 HAZARDOUS-3 (Sub-system) TEST SIMULATOR ASS'Y COMPONENT, MODE OF OPERATION, FUNCTION) 62029 2 Kin Thing then the ffm Kl-3 ffm file-i eth file-i Han Capit NO./REV. ten (52-1 fan (51-1 fan (51-2 stan (51-3 UNIT Rm ES ften 52-3 11th 151-5 fem 162-9 TABLE Fem 183 -18 C D M TI MUNTION FFM FN -1 NAME: \* . • Fem [2-1 **2** ITEM Ξ š 248 (A-232)

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Inprotellio) KOTE:

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## (FALLING "ODES & SEECUS ANALYSIS - SYSTEM) SAFETY ANALYSIS PALLING O LSO-HUD CONSOLE SYSTEM

"AEC-91-7958

UNIT 5 TABLE:

(Sub-system) TEST SIMULATOR ASS'Y NAME:

DMG. NO./REV.: 620598

Page 4 of 24

	ITEM DESCRIPTION  COMPONENT, MODE OF  COMPONENT, MODE OF  FAILURE HODE  COMPONENTION, FUNCTION)  CHAZARD RELEASE  CHAZARD CHAZARD RELEASE  CHA		<u> </u>		NAEC-91-7958
	HAZARDOUS- HAZARDOUS-	(ET)	If the DC power supplies produce large transients or consistent overvoltages, there is a passibility that the MUD consols input conditioning boards and/or the indicators will be damaged.  RECOMMENDATIONS:  1) Install overvoltage protection devices (OVP) across the power supply outputs.	When enough overvoltage is produced by the power supply, the OVP will short the power supply and the internal current limiting circuitry will shut the power supply down.	
HAZARD			(113)	٩	
1	£ 8	evali opazaki) Evali opazaki	(11)	H	
PAILURE	3.1. 5.1	DETECTAL BY OPERATOR	(10)	2	
	ION	POTENTIAL SEOJ	(6)	1	
	MISS	SSOT	€	1	
ON:	TEM	DYWYCE	3	ж	
EFFECT	SYS	SSOT	9	· · ·	
88	<u> </u>		(2)	1	
	LIVES E	3	ı		
HAZABOOIIS.	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	Pailure of proper regulation · resulting in large transients or consistent overvoltage(s).	
	RIPTION MODE OF FUNCTION)		(2)	System Circuitry Considerations a) Power Supplies PSI (24 VDC) PSI (70 VDC) PSI (18 VDC) provide DC power	
	ITEM	ġ	(3)		·

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; 7V-Neyligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Weasonably Probable; C-Occasional; D-Remoto; E-Extremely Improbable;
F-Impressible)

(EATURE "ODES & EFECTS ANALYSIS - SYSTEM) SAFETY ANALYTIS MKL KUI O LSO-1450 CONSOLE SYSTEM

MEC-91-7953

TABLE: UNIT.5

NAME: (Sub-system) TEST SIMULATOR ASS'Y

DMG. NO./REV.: 620598

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8					
•	COMMENTS: RECOMMENDATIONS;	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAFETY CONTROLS)	(13)	2) Install power supply indicator lamps in parallel with the OVP.  This lamp would inform the operator of a down power supply.  3) Utilize three additional positions on meter switch 88 to check the output of the power supplies on the DVM	
HAZARD	æ i	TILITA ABORT	(12)		
1	<b>E</b> 20	inottiezad evel grazah)	(11)		
FAILURE	37( 2)	EATCETEC BY TOTAREGO	(01)		
	MISSION	POTENTIAL POTENTIAL	(6)		
	MIS	SSOI	e		
EFFECT ON:	SYSTEM	DAMAGE	(7)		4
SFFEC	١.	SS01	(9)		
	PERSONNET	MUCKI	(2)	<del></del>	4
		FIAER	€		4
	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		
	ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	a) (cont'd)	
	ITEM	Ģ.	ε	<b>:</b>	
-				250 (A-234)	_

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastruphic; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improved Note: F-Imp

(FALLURE MODES & FEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MYLLMM 10 150-1101 CONSOLE SYSTEMI

NAEC-91-7958

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TABLE: UNIT 5

NAME: (Sub-eystem) TEST SIMULATOR ASS'Y

DMG. NO./RBV.1 620598

Page 6 of 24

NOTE: Hazard Leval, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-New;ligible)
Hazard Probability, Column 12, por MIL-STD-882A, para. 5.4.3.2 (A-Frequent; 8-Reasonably Probable; C-Oxxasional; D-Remote; E-Extremely Impuxbable;
F-Inpossible)

251 (A-235)

# (FATTIME MODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MICL MOD O LSO-HUD CONSOLE SYSTEM

MAEC-91-7958

TABLE: UNIT 5

(Sub-system) TEST SIMULATOR ASS'Y

HVE:

DMG. NO./REV.: 620598

Page 7 of 24

<u> </u>									
•••	SNOTING BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)	If properly seated, there should be no problems with these gaskets.			The test simulator weight 25 lbs. and is somewhat bulky	11.5" x 16" x 10".  • RECOMENDATION: That a two-handled enclosure be considered for incressed safety.	
HAZARD		PROBABILLTY CCCURRENCE	(12)	pa 6	_		Ü		
	20	EVELI OPAZAH)	(11)	III			111-11		
FAILURE	er Er	DETECTAE BY OPERATOR	(10)	2	£		V/N		
	MISSION	POTENTIAL SEOJ	(6)	1	1	•	1		
	MIS	ross	(8)	•	, .		,		
S.	TEM	DAMAGE	(2)	×	×		×		
FEBCT	DAMAGE SYSTEM CON CONTROL CON CONTROL CON CONTROL CON CONTROL		(3)	ı	,		ŀ		
區			(2)	ı	•		1		
	PERS	TIAES	3		ı		1		
na e a bordana	HAZARDOUS- FUNCTIONAL FAILURE MODE (HAZARD RELEASE MECHANISM)		(3)	Seal break- down result- ing in water ing in water ing in water intrusion and possible almulator damage	Seal breakdown	i) Rubber deteriorates due to environ- mental ex- posure (salt, water, etc.)	Enclosura failure	- Dropping the simulator - Handle failure	
	ITEM DESCRIPTION (COMPONENT, MODE OP OPERATION, FUNCTION)		(2)	1	b) Rubber gaskets	- MS51007-12 (1) - MS51007-10 (3) - MS51007-6 (1) provide seals around connectors 31 - 35.	The simulator enclosure drawing 517921.	Encases the test simulator circuitry and instruments. The simulator enclosure is equipped with one handle.	
	ITEM	<u>ું</u>	Ξ	2	•	······································	.:		

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.2 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Prequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
Cossional; D-Remote; B-Extremely Improbable;
Cossional; D-Remote; B-Extremely Improbable;
Cossional; D-Remote; B-Extremely Improbable; Kar:

252 (A-236)

# FALLING "ORES & EFFECTS ANALYSES - SYSTEM) SAFETY ANALYSES "KE YOU C LSO-HUD CONSOLE SYSTEM

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WEC-51-7958

8 of 24

UNIT 5 TABLE (Sub-system) TEST SIMMIATOR ASS'Y MAMB:

62029 DMG. NO./REV.

									NAEC-91-7958
•	COMMENTS: BECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES, SAPETY CONTROLS)	(13)			e <u>RECOMMENDATION</u> : Arrange for a coincidence between the dwg. 620766, Section B-B,	and the Schematic dwg. 621160, related to 58.	e RECOMMENDATION: That the DVM be externally tested when any unexpected output is observed.	The DWM has overvoltage protection to 500V.
HAZARD		YTT THE PROPERTY OF A CONTRESSED OF A CONTRESS	(12)			۵		٩	
1		TANSTATISALD EVEL GRASABI)	(11)			111		111	
FAILURE	्रा अप	EATOSTEG BY TOTAREGO	(10)			X ×		•	
	ION	POTENTIAL POTENTIAL	(6)			1		1	
	MISSION	SSOT	(8)			i		1	
Š	SYSTEM	DAMAGE	(3)			ı		ı	
EFFECT ON	SYS	SSOI	(y)			1		1	
超	NNE	YRUUNI	(2)			1		t	
	PERSC	SZAIT	3			t		ı	
OINOUGA BAIL	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)		No function	selection: - Switch S6 opens or shorts.	Tuternal fedition	PAN Jo	
	SZAIT	(2)	Digital Voltmeter Ml and Meter Switch S0.	Switch 58 is required to select the function under test. The functions controlled by this switch are:	er test Alrapsed, TAS/CLSG descent tion/trim	6. bug "y" 7. range		The HUD functions controlled by mater switch 58 will be analyzed from the viewpoint of the HUD consols display indicators. The DVM and meter switch 58 are assumed to be operational.	
		<u>ģ</u>	ε	2.0					

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impossible) NOTE:

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253 (A-237)

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FALLYOR, "YDRELA GERECIS ANALYSIS - SYSTEM) SAFELY ANALYSIS "MYL YON O 150-180 CONSOLE SYSTEM

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TABLE

(Sub-eyetem) TEST SIMULATOR ASS'Y NAM.

62029 DMG. NO./NEV.1

54	ITEM DESCRIPTION HARBOWN BY BYSTEM HISSION N. B. P.	_							
		COMMENDATIONS.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(11)	Detectable by lamp D41 (AC power) off	·	-	When operating properly the DVM will display voltages in the range 2.3 - 9.6 volts.	
	ASARD	20	LITTERSONS	(13)	۵		٠٥		
				Ē	H H			•	
	FAIL	S C	DETECTAS BY OPERATOR	9	:		•		
١		NOIB	ATTRETON S20J	<b>E</b>	ı				
١		MIS	SSOI	9	ı	•	1	-	
3	NO	TEM	25/6/(0	(7)	•		t		
	PECT	878	SSOI	(4)	1			•	
	ū	NNET	XXOCKI	(S)	1		,		
		PERBO	SZAIT	9	1		•		
	- PIROCUTE TO THE		FAILURE MODE (HAIAND MILEASE MECHANISM)	(3)	a) no indication 1) loss of 118 VAC input power	11, 72, 73, 67, 73, 67, 73, 73, 73, 73, 73, 73, 73, 73, 73, 7	All loss of PS3 (28 VPC) pwr. supply - internal failure b) incorrect indi-	1) fixed resta- tor RIO(1247) opens or shorts	11) fixed resistor R11 (1.3KR) opens or shorts
		ITEM DESCRIPTION	OPERATION, PUNCTION)	(2)	SPH-42 alrepood TNS/CLSG, Mater switch 80 position 2				
		H	<u>.</u>	Ξ	2.1				

Hasard Lavel, Column 11, per MIL-STD-862A, para. 5.4.3.1 (I-Catastrophio; II-Critical; III-Marginal; IV-Noyligible)
Hizard Probability, Column 12, per MIL-STD-862A, pura. 5.4.3.2 (A-Frequent; B-Pansonably Probable; C-Cocasional; D-Marote; E-Extremely Improbable; F-Improbable; C-Cocasional; D-Marote; E-Extremely Improbable; 

254 (A-238)

# (EARLURE "ODES & EFFECTS ANALYSES - SYSTEM) SAFETY ANALYSES "YO MOD OLSO-BUD CONSOLE SYSTEM

BC07-19-221"

TABLE: UNIT 5

NAMB: (Sub-system) TEST SIMULATOR ASS'Y

DMG. NO./REV.1 620598

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	HAZARDOUS- FUNCTIONAL FAILURE MODE HAZARD RELEASE LIVES HAZARD RELEASE LIVES HAZARD RELEASE LIVES HAZARD RELEASE LIVES HAZARD RELEASE HAZARD RELEASE LIVES HAZARD RELEASE LIVES HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD RELEASE HAZARD LIVES HAZARD RELEASE HAZARD RELEA		-+		NAEC-91-7958
	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)		•
HAZARD	ж ЭС	TTLIISASORT EDKORNIOCO	(12)		a
	בי) כוא	TROTTISZAD SVZI ORAZAH)	(11)		<b>∄</b>
PAILURE	्रा भा	DETECTAB BY SOTARISO	(01)		<u>*</u>
	SION	POTENTIAL SEOJ	(6)		1
	DAMAGE E		(8)		ı
r ON:	$oldsymbol{ol}}}}}}}}}}}}}}}}}$	DYWYCE	(2)	·	1
EPPECT		SSOT	(9)		ı
	OÑNE	YMUCKI	3		·
	PERS		€		1
- BINOUS AH	a (i		(3)	111) potentiometer 85 wiper arm 11fts off or shorts 1v) power supply PS3 (28 VDC) becomes un- regulated	a) no indication  i) luss of 115 VAC input power  ii) loss of fuss F1, F2, F3, or F4  - loss of AC power  - loss of relay switching power  iii) loss of P93 (28 VDC) power supply - internal fallure
			(3)	(cont.d)	Mate of Descent. Meter switch SB position 3.
	ITEM	ġ	3	:	2.2

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froguent; B-Neasonably Probable; C-Occasional; D-Nemote; E-Extremely Improbable;
P-Intro-cible)

255 (A-239)

NAEC-91-7958

(FALLUME "CODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MYL MOL O LSO-HUD CONSOLE SYSTEM

1.7.50-01-7053

UNIT 5

TABLE

NAME: (Sub-eystem) TEST SIMULATOR ASS'Y

DMG. NO./REV.: 620598

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17   17   17   18   18   18   18   18	ع					 						
TYPEM DESCRIPTION		SNOTTAGNEMMODER STREET	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)	When operating properly the DVM will display voltages in the range 0 - 11.2 volts.							low probability of simultaneous failures.
Then Description Functional Functional Conversion of Fallure Hook of Conversion (2) (3) (4) (5) (7) (8) (9) (10) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	AZARD	30	YTLILEAEOFG DKENNIDOO	(12)	۵			۵				
ITEM DESCRIPTION FUNCTIONAL COMPONENT: MODE OF COMPONENT: MODE OF FUNCTIONAL COMPONENT: MODE OF FUNCTIONAL COMPONENT: MODE OF FUNCTIONAL COMPONENT: MODE OF FUNCTIONAL COMPONENT: MODE OF FUNCTIONAL COMPONENT: MODE OF COMPON	1	<b>150</b>	ITADITIEZALD EVEL GRASAH)	(11)	111			111				
HARARDOUS— FUNCTIONA COMPONENT, MODE OF COMPONENT,	FAILU	37 37	EATDETEG BY ROTAREGO	(10)	yos			yes				
TYEN DESCRIPTION  (CONTONENT, MODE OF FAILURE PROFE  (CONTONENT, MODE OF FAILURE PROF  (CONTONENT, MODE OF FAILURE PROF  (CONTONENT, MODE OF FAILURE PROF  (CONTONENT, MODE OF FAILURE PROF  (CONTONENT)  (2)  (3)  (4)  (5)  (7)  (7)  (7)  (7)  (7)  (7)  (7		NOIS	POTENTIAL POTENTIAL	(6)	ı			t				
ITEM DESCRIPTION  (COMPONENT, HODE OF FAILURE HOOE  (INAZARD RELEASE NO ELECASE	MISS	SSOI	(8)	ı			j					
ITEM DESCRIPTION  (COMPONENT, HODE OF FAILURE HOOE  (INAZARD RELEASE NO ELECASE Š	TEM	ZDAMAG	(2)	ı			,					
ITEM DESCRIPTION  (COMPONENT, HODE OF FAILURE HOOE  (INAZARD RELEASE NO ELECASE FFECT	L_	SSOI	(5)				t .				3	
TTEM DESCRIPTION  (CONFONENT, MODE OF FAII  (PAII)  (CON't)  (CON't)  (CON't)  (CON't)  (CON't)  (A)  (A)  (A)  (A)  (A)  (A)  (A)  (	<b>a</b>	NNE	YMUCNI	(5)	ı	 · · ·		ı				
ITEM DESCRIPTION  (COMPONENT, MODE OF FAII (HAZI PENTION, FUNCTION)  (1) (con't) (con't) (2) (con't) (2) (con't) (11) (con't) (2) (14) (con't) (14) (con't) (15) (16) (con't) (17) (con't) (co		PEPS(	riaes	€	1			I				
ITEM DESCRI (COMPONENT; H OPERATION, FU (con't)  Ramp motion/trim. position 4.		HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	! _				11) loss of fuse Fl. F2, F3, or F4	- loss of Ac power - loss of re- lay switch-	ing power	111) loss of PS3 (28 VDC) and
3. CE		ITEM DESCRIPTION	CCOMPONENT, MODE OF OPERATION, FUNCTION)	(2)	(con't)							
<u> </u>		ITEM		ε	3.2		6					

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improssible)

256 (A-240)

# (FATEURE FORES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS WYL MOD O LSO-HUD CONSOLE SYSTEM

1

Lay Cabba sea

UNIT 5 TABLE: (Sub-system) TEST SIMULATOR ASS'Y HAME:

620598 DMG. NO./REV. 1

"AEC-91-7958

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					NAEC-91-7958
•	COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS)	(13)	When operating properly the DVM will display voltages in the range -11.6 to +11.4 volts.	
HAZARD	Q.	WILLIEFEORG ENGINICO	(12)	٩	
1	(ZZ	TROPIEZAD TVZI GRASAH)	(11)	111	,
FATLURE	271 271	EATDETEC YE ROTARETO	(10)	90%	
	ION	POTENTIAL POTENTIAL	(6)	1	
	MISSIM	SSOT	(8)	1	
NO NO	SYSTEM	DAMAGE	(1)	ı	
EPPECT ON	SYS	SSOT	(6)	1	
3	PERSONNEL	YMOUNI	(2)	1	
	PERSO	LIVES	3	ı	
-SHOULD	FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(2)	b) incorrect indication i) fixed resistor R7(3.6kd) opens or shorts,	Palis Pa
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd)		
	ITEM	9	3	2.3	

idazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Ramote; E-Extremely Improbable;
[Lizard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; P-Ramote; E-Extremely Improbable;
[F-Nurrosiths]

257 (A-241)

NAEC-91-7958

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(IATER POSES & FEEGUS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI JOH OLLOWING CONSOLE SYSTEM

NAME: (Sub-eystem) TEST SIMILATOR ASS'Y

UNIT S

TABLE:

DMG. NO./REV.: 620598

"NEC-01-790"

8						*
		COMMENTS: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES: SAFETY CONTROLS)	(13)	Detectable by lamp DS1 (AC power) off	Low probability of simultaneous failures.
	HAZARD	20	YTT.TT.RAGORY COMBRIGGO	(12)	۵	
	• (	(Z	TROTHISZAD EVEL GRASARI)	3	H	,
	FAILURE	271 271	EATCETAG BY FOTARSTO	(10)	yes	
		NOI	POTENTIAL POTENTIAL	(6)	ı	
		MISSION	SSOI	(8)	t	
	No	TEM	DAMAGE	(7)	g.	
	EFFECT ON	SYSTEM	SSOT	(5)	8	
	E .	NNET	EMOUNI	(2)	t	
		PEPSONNEL	SZAIT	(4)	t	
		FUNCTIONAL	FALLURE HODE (HAZARD RELEASE MECHANISM)	(6)	a) no indication 1) loss of 115 VAC input POWSE	### F1, F2, F3, or F4 - loss of AC power - loss of xelsy switching power ####################################
		ITEM DESCRIPTION	OPERATION, FUNCTION)	(2)	Bug "x". Meter switch position 5.	
		ITEM	O	ε	2.4	

Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastroyhic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-Improved to the Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; NOTE:

Value Inc.

258 (A-242)

# FALLING POPES & FFECTS ANALYSES - SYSTEM) SAFETY ANALYSES MKI MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958\_

INIT 5 TABLE

(Sub-system) TRST SIMULATOR ASS'Y NAME:

62029 DMG. MO./REV. 1

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	_		_	_						NAEC-91		
•	IENTS; R PENSATI SAFETY		(13)		When operating properly the DWN will display voltages in the range -24 to +28 volts.				Detectable by lamp DS1 (AC power) off.	•	low probability of simultaneous	
HAZARD	æ	YTLIIZAZORQ ZVZHNUXXX	(12)	۵				۵				
]	Z 23	TWOTTIESAD EVEL GRASAH)	(11)	111				, H				
FAILURE	<b>27</b> 1	DETECTAB BY OTARIGO	(10)	yes				•				
	ION	POTENTIAL SECI	(9)	1				ı				
	MISSION	SSOI	(8)	-								
Š	SYSTEM	DAMAGE	(2)	1				ı				
EPPECT	'	SSOT	(3)	-				ı				
	PERSONNEL	XXOCNI	(2)	ι				1				
	PERS(	FIAES	(4)	1				Ł				1 Jura
GINGGERAN	FUNCTIONAL	PAILURE MODE (HAZARD RELEASE MECHANISM)	(2)	b) incorrect indication .	1) potentiomater R1 wiper arm lifts off or shorts,	11) power supply P3 (28 VDC) fails or be-comes unregulated,	111) prver supply PSI (24 VDC) falls or be- comes unreg- ulated.	a) no indication	1) loss of 115 VAC input power,	A1) loss of fuse P1, P2, P3, or P4	111) loss of PS3 (28 VDC) and	PS1 (24 VDC) power - supplies - Internal failure
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont'd)				Bug "I", Meter switch SB position 6.				
	ITEM NO.			2.4				· · ·				

NOTE: Hazard Level, Column 11, per HIL-STD-882A, para. 5.4.3.1 (I-Catustruphic; II-Critical; III-Marginal; IV-Negligible)
Hazard Probability, Column 12, per HIL-STD-882A, para. 5.4.3.2 (A-Pruphent; B-Reasonably Probable; C-Occasional; U-Rumote; E-Extremely Improbable;
P-Improbable; P-Improbable; P-Improbable; C-Occasional; U-Rumote; E-Extremely Improbable; P-Improbable; P-Impro

259 (A-243)

NAEC-91-7958

(FALLURE NODES & EFFECTS ANALYSIS - SYSIEM) SAFETY ANALYSIS NK. "90 0 .50-1"10 CONSOLE SYSIEM

NAEC-91-7958

(Sub-system) TEST SIMULATOR ASS'Y

NAME:

UNIT 5

DMG. NO./REV.: 620598

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ود	_										
	WROTH COMMENTS	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS)	(13)		When operating properly the DVM will display voltages in the range +28 to -24 volts.			When operating properly the DVM	viii dispisy voiceges in the range 0 - 70 volts.	•	
- HAZARD	30	YTLITEAEORG DKODRUCCO	(12)	۵			•	۵			
	(7)	TEADTTEZALD EVZI ORASAH)	(11)	111				111			
FAILURE	27 271	EATTECTAG YE ROTAREGO	(10)	į				į			
	MISSION	FORE FOLINT	(6)	1				ı	-		
	MISS	SSOI	(8)	ı				,			
₹	SYSTEM	DYWYCE	(7)	ı				ı			
EFFECT ON:	SYS	ross	(5)	1				ı			
M	PERSONNEI	YNUCKI	(2)	1				ı			
	PEPS	FIAES	(4)	•				1			
	HAZARDOUS- FUNCTIONAL	FAILURE WODE (HAZARD RELEASE MECHANISM)	(3)	b) incorrect indication	i) potentiometer R2 wiper arm lifts off or shorts,	11) power supply PS3 (28 VDC) falls or be- comes unreg- ulated,	iii) prver supply PS1 (24 VDC) fails or be- comes unreg- ulated.	a) no indication i) loss of 115	VAC input power ,	#1) loss of fuse F1, F2, F3, or F4 - loss of AC power - loss of relay	power, 111) Loss of PS2 (70 VDC)
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(con't)				Mange. Meter switch SB position 7.			
	NO.			2.5		260 (A-244		2.6			

Hazard Level, Column 11, per MIL-STD-882A, pare. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Negligible)
Huzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; P-Improvational) 

260 (A-244)

### (FAZIURE MODES & EFFECTS AMALYSIS - SYSTEM) SAFETY AMALYSIS, MAL MOD OLSO-1990 CONSOLE SYSTEM NA-C-91-7958

S TIME TABLE (Sub-system) TEST SIMHLATOR ASS'Y HANE:

DMG. NO./REV.1

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		_	NABC-31-/336	,
	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)		When operating properly, the DVM will display voltages in the range 0-70 volte.	
T T T T T T T T T T T T T T T T T T T	O TITLIFAMORY SECTION OF THE PROPERTY OF THE P	(13)	<u>.</u>	altathle
, (°	OPPOPTEZALO JEVALI GYAZARI)	(11)		77
EALLORED P	DETECTABI BY OPERATORS	(10)	**************************************	-Margina
MISSION	POTENTIAL	(6)	-	111
	SSOT	9	•	1110
SYSTEM	DYWYCE	3	•	9
<u>.</u>		છ		į
E RECONNEL	MOCKI	(5)	1	186
PERS(	SZAIT	3	t	2
HAZARDOUS-	PAILORE HODE (HAZARD RELEASE MECHANISM)	(3)	### Bupply  - Internal failure b) Incorrect indication  ### Horen Rid  ### Horen Rid  ### All Power supply ### Power supply ### Power supply ### Country  ### All Power supply ##	82A. cara, 5.4.3.1 (I-Catastrophic, II-Critica), III-Marginal, IV-Manifolible)
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	(cont ' d)	Hazard Level Column 11 per Mil. 900-882A para
ITEM	Q	ε	3.6	NORTH Hay

261 (A-245)

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(FALLURE "ODES & EFFECTS ANALYSIS - SYSIEM) SAFETY ANALYSIS MKL MOD 9 LS9-HUD CONSOLE SYSTEM

MAEC-91-7958

NAME: (Sub-system) TEST SIMULATOR ASS'Y

UNIT 5

TABLE:

DAG. NO./REV.1

					_			
COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURE SAFETY CONTROLS)			to monitor and test the switches control operation the WID console functions, t switch SI is a five-deck		Detectable by lamp DS2	Detectable by lamp DS2		
30	TILIBARCHY TMENUCO	(15)		۵			۵	
(N)	Troffisald Evel Grashi)	(11)	the cap ind angl tion sel the synch	111			111	
371 21	EATCETAG YE ROTAREGO	(10)	provides ty, 4) to our-positions.	Yes			X.	
ION	FOLENTIAL	(6)	eloc s a	ı	_		1	
MISS	SSOI	(8)		1			1	
TEM	DAMAGE	(7)		,			1	
SYS	SSOI	(9)	phase speed and DS2 t	1			ı	
NNET	YAUCNI	(2)	ngle og al switc lamp	1			•	
PEPSO	PIAES	•		,			ı	
HAZARDOUS- FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	uitry. The listync of true Airspeed, 2) true Airspeed, 2) the on-off synchro growided with an indictors.	a) No Indication	1) Loss of 115 VAC input Power	ii) Switch 82 fails open	b) Incorrect Indication	1) Synchio select switch 83 shorts or opens
ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	Test synchro Bl and associated circlications of the test synchro. Switch 82 is above. The AC power circuitry is payene switch controlling the synchri	Synchic select switch 83 positions				•
ITEM NO.			3.0		26242	246	-	
	ITEM DESCRIPTION FUNCTIONAL PERSONNEL SYSTEM MISSION A 2 2 B	ITEM DESCRIPTION HAZARDOUS- COMPONENT, MODE OF FAILURE MODE OPERATION, FUNCTION) HECHANISM HECHANISM) HECHANISM HECHANISM) HECHANISM HECH	ITEM DESCRIPTION  (COMPONENT, MODE OF FUNCTION)  (HAZARD NELEASE FOR STEM HISSION LE FUNCTION)  (HAZARD RELEASE FOR STEM HISSION LE FOR STEM HISSI	ITEM DESCRIPTION  FUNCTIONAL	ITEM DESCRIPTION  (COMPONENT, MODE OF FAILURE MODE  (COMPONENT, MODE OF FAILURE MODE  (HAZARD RELEASE NOTE  (HAZARD RELEASE  (HAZARD RELE	17EH ITEH DESCRIPTION FUNCTION FUNCTION FOR PRESCRIPTION FOR PRESCRIPTION FOR PRINCIPLE HORE FOR PRESCRIPTION FOR PRINCIPLE HORE FOR PRESCRIPTION FOR PRESCRIPT	TTEM DESCRIPTION  (CONFONENT, MODE OF FAILURE MODE (CONFONENT, MODE OF FAILURE MODE (CONFONENT, MODE OF FAILURE MODE (CONFONENT, MODE OF FAILURE MODE (HAZARD RELEASE NEW TO CONFONENT, MODE OF THE CHANISM)  (2) FAILURE MODE (CONFONENT)  (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)  (4) (5) (6) (7) (8) (9) (10) (11) (12)  (5) (6) (7) (8) (9) (10) (11) (12)  (6) (7) (8) (9) (10) (11) (12)  (7) (8) (9) (10) (11) (12)  (8) (9) (10) (11) (12)  (9) (10) (11) (12)  (10) (11) (12)  (11) (12)  (12) AAAAND RELEASE SET OF	ITEM DESCRIPTION HUNDROUS  (COMPONENT, MODE OF PAILURE HODE  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON, FUNCTION)  (IAZARD RELEASE HEALTON H

Hezard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Medilgible) Hezard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Froquent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Impossible)

HOTE:

262 (A-246)

# (FALLURE "ODES & FEEECIS ANALYSIS - SYSTEM) SAEETY ANALYSIS MKL MOP O LSO-HUD CONSOLE SYSTEM

NAEC-91-7558

INIT 5 TABLE:

TEST SIMILATOR ASS'Y (Sub-system) NAMB:

DMG. NO./REV.:

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_			_	
	SHOTTANENDATE: RECOMMENDATIONS:	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES) SAFETY CONTROLS)	(13)	In the schematic the MOVIAS switch, S10, is a 12 position switch. Position 1 is off and position 2 tests three lamps. The decal and photograph show a 12 position switch where pos. 1 tests lamp 1 and pos. 2 tests Lamps 2 and 3. On off is controlled by a toggle switch which is not found in the schematic. Recommend these differences be resolved.
HAZARD		YTT.IIEA@OFT	(12)	a
,	E 2	Troftskid Sval Grandi	(11)	<b>H</b>
FAILURE	27 271	EATCETEC YE YOTANISCO	(10)	<b>9</b>
	MISSION	POTENTIAL SECI	(6)	ı
	MISE	SSOI	(8)	1
No.	BYSTEM	DYMYCE	(3)	•
EPFECT	l i	SSOT	હ	•
2	PERSONNET	EMUCHI	3	•
	PERS	SZAIT	€	1
0110000	FUNCTIONAL	FALLUR MODE (HAZARD RELEASE MECHANISM)	(6)	a) no indication  i) loss of listy to the power  ii) loss of fuse bl. F2, F3, or F4  - loss of AC power  - loss of AC relay switching power  111) loss of P3 (28 WC) power  111) loss of P3 (28 WC) power  111) loss of P3 (28 WC) power  111) loss of P3 (28 WC) power  111) loss of P3 (28 WC) power  111) loss of P3 (29 WC) power  111) loss of P3 (20 WC) power  111) loss of P3 (20 WC) power  111) loss of P3 (20 WC) power  1111) loss of
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(2)	MOVIAS - Manually Operated Vieual Landing Aid System, Switch 810. The MOVIAS repeater duplicates, on the MUD consols, the display of datum bar and meathall lights that the pilot observes.
	ITEM	ž	(1)	•

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mesilgible)
Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; B-Extremely Improbable;
F-Impropable;

NOTE:

263 (A-247)

of 24

13

(FALLING MORES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MICH O LSO-141D CONSOLE SYSTEM

(Sub-system) TEST SIMULATOR ASS'Y

NAME:

UNIT 5

620598 NO./REV. DHG.

MAEC-0:-7953

COMPENSATING PROVISIONS
ACCIDENT PREVENTION HEASURES
SAFETY CONTROLS) Detectable by lamp DS 1 (AC power) only. COMMENTS, RECOMMENDATIONS, (12)**ENGINEEN** FAILURE - HAZARD ۵ ۵ HAZATI ORAZAH) III III DETECTABLE BY OPERATOR? 9 ž yes FOTENTIAL 6 MISSION 1 ê SSOI • SYSTEM 3 BPFECT ON DYMYCE ı (6) ı SSOT BREONNEI 9 INJUEX . Ξ ı **FIAE2** FAILURE MODE (HAZARD RELEASE WECHANISM) power supply - internal 1) power supply 11) loss of fuse F1, F2, F3, or F4 - loss of AC switching power PS3 (28 VDC) loss of PS3 becomes un-regulated 1) loss of 115 no indication power - loss of switch 810 iv) switch S6 and/or S4 V:.C Input failure FUNCTIONAL (28 VDC) incorrect relay shorts power opens 3 111) **F** ā 7 Aircraft Type. Switches SS and S4 select the aircraft type to be displayed on the HUD console. (COMPONENT, MODE OF OPERATION, FUNCTION) 3 (cont'd) ITEM 3 Š 0. s. 0

Hazard Level, Oblumn 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible) Hazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Rossonably Probable; C-Occasional; I-Remote; E-Extremely Improbable; F-Immasible) 

264 (A-248)

THE PERSON S.

# (FALLURE MORES & "FEECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKI MOR O 150-FUD CONSOLE SYSTEM

NAEC-97-7958

S TIMI TABLE

(Sub-system) TEST SIMULATOR ASS'Y NAME:

DNG. NO./REV. 1 620598

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NAEC-91-7958\_

CEALLINE "ODES & EFECCIS ANALYSIS - SYSTEM) SAFETY ANALYSIS XXL MOT O LSO THIS CONSOLE SYSTEM

8567-16-27Mi

TABLE: UNIT S

(Sub-system) TEST SIMULATOR ASS'Y

DMG. NO./REV.: 620598

HAVE:

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58_					
	•	COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS ACCIDENT PREVENTION MEASURES SAFETY CONTROLS;		(13)	Detectable by lamp DSl (AC power) off.
	HAZARD		PROBABILLITY SCEUPIEDICE	(12)	۵
			Trotiesad Evel Grasan)	(11)	E .
	FAILURE	<b>27</b> (	EATTETTAG SY ROTARETO	(10)	# 0 >
		MISSION	POTENTIAL SEOJ	(6)	1
		MIS	SSOT	(8)	
1	E ON	SYSTEM	DAMAGE	(2)	
	EFFECT	_	SSOT	(3)	1
		PERSONNE	MUCHI	(2)	ı
		PERS	FIASS	3	1
		FUNCTIONAL	FAILURE MODE (HAZARD RELEASE MECHANISM)	(3)	a) No indication  1) Loss of 115 VAC input power,  11) Loss of fuse F1, F2, F3, or F4  - Loss of AC power  - Loss of AC power  - Loss of AC power  power  power
	ITEN DE (COMPONEN OPERATION		(2)	Automatic Carrier Landing System (ACLS) status.  The ACLS indicates a lock-on and one of three modes of operation as follow:  Mode I - Full ACLS landing Wode II - Instrument landing Mode II - Talk Down landing The ACLS indicators are powered by 28 VDC and testing is controlled by 85, a four position, double deck wafer switch.	
			ε	•	

NOTE: Hazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; III-Critical; III-Marginal; IV-Megligible)
Ibzard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable;
F-/ cityl.

Valle Marin

266 (A-250)

CEALURE "ODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MKL MUD O L'SO-HUD CONSOLE SYSTEM

WAFC-01-7958

TABLE: UNIT 5

AME: (Sub-system) TEST SIMULATOR ASS'Y

DMG. NO./REV.: 620598

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$\overline{}$				NAEC-91-7958
	- SHOLLEGNAMMODAG - SENAMMOD	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAPETY CONTROLS)	(13)	
HAZARD	30	SYCENEUTTY CCCURGENCE	(12)	a .
1	(T	INOTHISAD BYLL (MANA)	(11)	II.
FAILURE	3.1 ()	EATCETAG BY ROTARAGO	(10)	*
	HIBSION	POTENTIAL S201	(6)	1
	HIBE	SSOI	(8)	!
8	SYSTEM	DYMYCE	(7)	ı
BFFECT ON:	L	<b>3501</b>	(9)	•
- SE	PERSONNEL	YHUUNI	(2)	
	PERS(	SZAIT	(4)	
	FUNCTIONAL	PAILURB MODE (HAZARD RELEASE MECHANISM)	(3)	iii) loss of P83 (28 VDC) power supply - internal failure iv) switch S5 opens b) incorrect indication i) power supply P83 (28 VDC) fails or be- comes unreg- ulated ii) switch S5 shorts
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, FUNCTION)		(3)	(cont'd)
	ITEM NO.			• · · · · · · · · · · · · · · · · · · ·

leazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; TV-Neciligible)
leazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 [A-Frogwent; B-Russonably Probable; C-Occasional; D-Resoto; E-Extremely Improbable;
P-Impossible)

NOTE:

267 (A-251)

NAEC-91-7958

THE RESERVE OF THE PARTY OF THE

(FALLURE YORSS & SEFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS "Y" MILL O'S" "II CONSOLE SYSTEM

IMIT FABLE:

(Sub-eystem) TEST SIMULATOR ASS'Y MAR

62029

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7.0

"Arc-0"-745

COMMENTS; RECOMMENDATIONS; COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES; SAFETY CONTROLS) Detectable by lamp DS1 (AC power) off. of 24 Page 23 (13) (12) **ENGINE** - HAZARD SO TITTIEVEDE ۵ (HAZARO LEVEL) III FAILURE **OPERATOR?** (10) DETECTABLE BY Yes POTENTIAL ROSS 6 MISSION . 8 SSOI EFFECT ON SYSTEM 3 DYWYCE (9) **SS01** . BREONNEL (2) INJUEX ŧ Ξ TIAES (HAZARD RELEASE loss of fuse - loss of AC power supply lose of 115 F1, F2, F3, evitching loss of PS3 PAILURE MODE no indication - internal V'C input loss of failure switch 89 FUNCTIONAL MECHANISM) (28 VDC) POWER relay POWER or F4 POWer 3 = 3 111 2 The LSO wave off activates This is a three position toggle red flashing lamps (90 flashes/ min.). The ACLS wave off acti-vates a blue flashing light (180 ewitch (forward = LSO wave off, center = off, back = ACLS wave wave off and LSO wave off COMPONENT, HODE OF OPERATION, FUNCTION) (2) flashes/min). NO./REV. ewitch, 89. 5 Hari Ξ

Hazard Level, Column 11, per MIL-STD-802A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Meyligible) Hazard Probability, Column 12, per MIL-STD-802A, para. 5.4.3.2 (A-Frequent; B-Reasonably Probable; C-Occasional; D-Remote; E-Extremely Improbable; F-Immostible) NOTE:

opens or

shorts

268 (A-252)

(FALLURE "ODES & EFFECTS ANALYSIS - SYSTEM) SAFETY ANALYSIS MYL VIII O LSO-HUD CONSOLE SYSTEM

A Comment of the Comm

WAEC-91-7958

UNIT 5 TABLE:

(Sub-system) TEST SIMULATOR ASS'Y NAME:

620598

DING. NO./REV.

Page 24 of 24

							NAEC-91-7958
	SNOTT-GONDAMACON . STUDIES.	COMPENSATING PROVISIONS (ACCIDENT PREVENTION MEASURES SAFETY CONTROLS)	(13)			Detectable by lamp DS1 (AC power) off.	
HAZARD	3	MILITARABORY DESPRICO	(12)		۵		a
	(7)	indihisald avai ohasah)	=======================================		1111		ä
FAILURE	37 37	DETECTAL BY OPERATOR	(10)		y•4		•
	MISSION	POTENTIAL LOSS	6)		ı		1
	SIM	SSOI	(8)		1		ſ
ON	SYSTEM	DYWYCE	(7)		1		
EFFECT	SYS	SSOI	(6)		1		1
i ii	NNET	XXOCNI	(5)		1		t
	PERSONNET	FIAES	(4)		,		į.
HAZADOOLIG		FAILURE MODE (HAZARD RELEASE MECHANISM)	(6)		a) no indication	1) loss of 115 VAC input power	11) loss of fuse Pl, F2, F3, or P4 - loss of AC - loss of relay switching power  111) switch 87 opens b) incorrect indication i) switch 87 shorts
	ITEM DESCRIPTION (COMPONENT, MODE OF OPERATION, PUNCTION)		(2)	Clear deck/foul deck. The clear deck/foul deck indicators are controlled by a three pole, double throw switch, ST. A green light indicates a clear deck, while a red light indicates a fouled deck. These indicators are powered by lis VAC.		•	
	ITBM NO.		(E)	o.			

Mazard Level, Column 11, per MIL-STD-882A, para. 5.4.3.1 (I-Catastrophic; II-Critical; III-Marginal; IV-Mediligible)
Mazard Probability, Column 12, per MIL-STD-882A, para. 5.4.3.2 (A-Frequent; B-Ressonably Probable; C-Occasional; IV-Nemote; E-Extremely Improbable;
F-Impossible) NOTE:

269 (A-253)

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APPENDIX B
H/FMEA RECOMMENDATIONS SUMMARY

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MK1 MOD O LSO-HUD CONSOLE SYSTEM

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		S	SA	REI	ATE	FO	2:		
жо.	RECOMMENDATION	UNIT	ITEM NO.	a	D	C	d	•	£
1	It is recommended that the CRT and Yoke be enclosed by a protective cover if the only removal path is through the console front. The cover should be secured to the CRT envelope and provide access for the removal of the high voltage lead and connections to the CRT and yoke.	1	15.0.b		x	x	x	x	x
2	Place a wide wire mesh screen over the front face of the projection lamp to preclude accident during maintenance.	1	23.0.a		×	×	×	x	×
3	Create a sandwich of the combiner glass and a plastic neutral density filter on the observer side of the combiner glass.	1	24.0.a		×	x	×	x	x
4	Incorporate a compression pin locking device on the side of the mirror and support assembly base to lock and maintain the support arm in the vertical attitude regardless of knurled knob tension.	1	24.0.a		x	x	×	×	×
5	Incorporate a compression pin locking device on the spherical mirror hold-down latch.	1	24.0.a		×	×	x	×	x
6	Provide a warning circuit within the LSO Console (aural & visual) to warn the user that an excursion has occurred which may, or may not, have caused damage that requires the attention of maintenance personnel.	2	1.0.a	х	x	x		×	×
7	Provide individual indicators on the LSO console for each voltage as a confidence indicator ("GO"/"NO-GO").	2	1.0.a	x		×		x	×
8	Provide overvoltage protection for each power supply output to bar against damaging transients.	2	1.0.a		×	×	x	×	×
9	Replace the dependency of the main power control bus on the airflow switch - let loss of cooling airflow energize a warning indicator which coordinates with items 6 and 7 above.	2	1.0.a	x	x	x	x	×	×

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards
- **b** -
- Controlling & Minimizing Potential Hazards
- Incorpóration of Fail-Safe Principles
- Existing Design Future Design

### NAEC-91-7958

MK1 MOD O LSO-HUD CONSOLE SYSTEM

		S	SA	REI	ATEI	70:	: 1	FO	R:
NO.	RECOMMENDATION	UNIT	ITEM NO.		b	c ·	_	•	1
10	Arrange with the vendor (Galland Henning Nopak, Inc. 1025 S. 4th St., Milwaukee, Wisc. 53215) to provide round and smooth corners and edges to avoid personal injury, on their dwg. C-22026CY.	3A1	1.1.2. 1.a	х	х	x		ж	x
11	Arrange with the same vendor to provide ample raddi to form round fillets between the attaching feet and the body of this part:	3Al	1.1.2. 1.b	x	x	x		x	x
	e e								
12	(Vendor's dwg. D-417SK; applies to Nos. 10, 11, 12)  Arrange with the same vendor to incorporate an air purging or other means to get rid of the upper air bubble, to assure the gland to be always bathed in the hydraulic liquid.	3Al	1.1.2. 1.c	х	x	x		x	x
13	Arrange with the vendor (G.H. Nopak, Inc.) to specify ample raddi in all fillets, especially those that could cause stress concentration, and to premachine the Round Stock to prepare it better for the welding to the tubing. See sketch below (Piston Rod, item 4 of Cylinder 620728-4)	3Al	1.1.2. 2.a	·x	х			x	х
	The Common of th								

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards
- Incorpóration of Fail-Safe Principles
- Existing Design
- Future Dasign

MK1 MOD O LSO-HUD CONSOLE SYSTEM

NAEC-91-7958

		S	SA	RELATED TO:		: 1	FO	R:	
NO.	RECOMMENDATION	UNIT	ITEM NO.	ā	Ъ	6	d	•	f
14	Arrange with the vendor to drill the perpendicular hole first and the axial hold second. See sketch: (Piston Rod, item 4 of Cylinder 620728-4)	3Al	1.1.2. 2.b	x	x			ж	x
	Planeral re-mind								
15	Arrange with the vendor to provide an assured "soft touch" for the upper limit of the stroke, and the hydraulic pressure release under the PISTON at reaching the upper limit of the stroke, derived from the movement of the PISTON.	3 <b>A</b> 1	1.1.2.	x	x			x	x
16	Arrange with the vendor to provide round/ smooth corners and edges that can be expected to be handled/touched by the Navy personnel.	3Al	1.1.2. 5.a	x	x	x		x	x
17	Arrange with the vendor to specify radii for the important fillets! See sketch:	3A1	1.1.2. 5.b	ж	x	x		x	×
	MILLIANTE BE								
18	For the Limit Switches LS1 & LS2 (620728-5):	3A1	1.1.3. b	×	×	x		х	x

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards Incorporation of Fail-Safe Principles

- Existing Design Future Design

### SUMMARY, SYSTEM SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

### NAEC-91-7958

		Ş	SA	REI	ATE	70	:	FO	R:
NO.	RECOMMENDATION	UNIT	ITEM NO.	4	b	c ·	ط	e	1
18 (cont)	<ul> <li>i) Introduce the necessary pre-opera- tional checks of the System to be performed before the intended use.</li> </ul>								
	ii) Provide a protection arrangement to keep the debris from falling between the Roller and the Cam.								
19	Provide the two existing rubber inner pade 518987-2 to "overhang" the length of the Half Clamps; also, provide a 45° chamfer or round the inner edges of the Half Clamps.	3Al	1.1.4	x	×	x		x	×
20	It is always recommended (particularly for the new designs) to place the pump under the tank so that the Pump's suction column will be filled with a positive pressure.	İ	1.2.1.a	x	×	×		x	x
	The need for priming will be avoided and the efficiency of the Pumps will increase.								
21	Provide two gussets welded inside the Tank against the outside gussets 620579-11, to strengthen the support of the Air Motor/Pump Assembly.	3A2	1.2.1.b	x	x	x		x	x
22	Re-evaluate the filtering arrangement and specify the correct filter element for 620582-6.	3A2	1.2.2	x	×	×		x	×
23	For the Air Motor 518913-1:	3A2	1.2.3a	×	×	×		×	×
	a) Mention in the Operation and Mainte- nance Manual the need to provide load to the Air Motor or otherwise limit its speed to 10% above that at maximum power.								
	b) Provide an overspeed governor or shut- off arrangement.								
24	Evaluate the test results in cold, humid weather and introduce the corrective action as necessary, to avoid the air exhaust to get clogged by frozen, condensed moisture.	3A2	1.2.3.b	x	x	x		x	x

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards Incorporation of Fall-Safe Principles

- Existing Design Future Design

			C2 1						
NO.	RECOMMENDATION	UNIT	SA ITEM NO.	_	ATEL	70 c	<u>.</u>	FO	R:
25	Provide filtration of the Hydraulic Fluid to 25 micron or better, as required (to avoid contamination of the Hydraulic Fluid and the Relief Valve 517792-1).		1.2.6.a		x	x		х	×
	One possible way could be by changing the connection as shown in the following HYDRAULIC schematic:  TO:  FROM:  F								
26	Re: Schematic Diagram 620580: Provide the connections in such a way that there will be an automatic interlocking, or an automatic return of Azimuth and Elevation to their aligned positions upon activating the HUD-Down switch(es) before the HUD would start moving down, or keep the LS2-B contacts always open(!)		1.2.7.a	x	x	х		x	x
	NOTES: 1 There should be no connection between pins LS4-2 and LS5-2!  2 For better reliability of the observation light to be "on", eliminate the LS1-B! (Leave only LS1-A to switch the observation light "on".)								

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards
- Incorporation of Fail-Safe Principles
  Existing Design
  Future Design

### NAEC-91-7957

### MK1 MOD O LSO-HUD CONSOLE SYSTEM

	S	SA	REI	والمتحارب والمتحارب والمتحارب		FO	R:	
RECOMMENDATION	UNIT	ITEM NO.	a	ь	С	đ	•	f
For the Filter 518897-1:	3A2	1.2.8.2	x	x	x		x	x
<ul><li>a) Provide also electrical Dirt Alarm (available in this line of filters).</li></ul>								
b) Provide enough room for easy/quick replacement of the Filter Element.								
c) Show the Dirt Alarm pointer and scale of this Filter on the assembly drawings:								
620582-1 (Piping Assy) & 620578-1 (Hydraulic Power Package).								
Provide a tie between the upper end (the Filter 516965-1) and the Support Frame 620581-1 to eliminate or greatly reduce the vibration of the Filter.	3A2	1.2.8.3	x	x	x		x	x
To assure an increased reliability of the Switch-Inidcator A620741-4 (L8-S6) "HUD-DOWN" against short between contacts 7-8, provide a redundancy by connecting the contacts:	3 <b>A</b> 3	1.3.2. 4.c	x	x	х		x	x
5 FRM; 7 6 5 TO: 7 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7								
	For the Filter 518897-1:  a) Provide also electrical Dirt Alarm (available in this line of filters).  b) Provide enough room for easy/quick replacement of the Filter Element.  c) Show the Dirt Alarm pointer and scale of this Filter on the assembly drawings:  620582-1 (Piping Assy) & 620578-1 (Hydraulic Power Package).  Provide a tie between the upper end (the Filter 516965-1) and the Support Frame 620581-1 to eliminate or greatly reduce the vibration of the Filter.  To assure an increased reliability of the Switch-Inidcator A620741-4 (L8-S6) "HUDDOWN" against short between contacts 7-8, provide a redundancy by connecting the	For the Filter 518897-1:  a) Provide also electrical Dirt Alarm (available in this line of filters).  b) Provide enough room for easy/quick replacement of the Filter Element.  c) Show the Dirt Alarm pointer and scale of this Filter on the assembly drawings: 620582-1 (Piping Assy) & 620578-1 (Hydraulic Power Package).  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- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards
- **b** -
- Controlling & Minimizing Potential Hazards Incorporation of Fall-Safe Principles
- Existing Design
- Future Design

	· · · · · · · · · · · · · · · · · · ·		SA	RELATED TO:			FO	<b>?</b> :	
NO.	RECOMMENDATION	UNIT	ITEM NO.	a	ь	6	d	•	Ĺ
30	To increase the reliability in the K2 Relay 518915-1 against the NC contacts A failure to close, wire the K2 Relay according to the circuit diagram:  TO: (K2)  D3  D3  D3  C3  C3  C3  C3  C3  C3  C3	3A4	1.4.1. b.ii	x	×	x		×	x
31	To increase the reliability in the Kl Relay 518915-1 against the NO conatcts B failure to close, wire the Kl Relay according to the diagram below:	3A4	1.4.1. e.i	x	x	x		x	x
	FROM: (KI)  D3  D1  D2  C3  C1  E3  E3  E3  A3  A1  A2  A3  A1  A2  A1								

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards

- Incorporation of Fail-Safe Principles
- Existing Design Future Design

### SUMMARY, SYSTEM SAFETY ANALYSIS MK1 MOD O LSO-HUD CONSOLE SYSTEM

### NAEC-91-7958

		9	SA	REL	ATEL	70:		FO	₹:
NO.	RECOMMENDATION	UNIT	TEM 10.	a	ь	c	ا ه	•	1
32	Wire the K2 Relay as shown to increase reliability against the short of the N0 contacts B:	3A4	1.4.1. j.ii	х	×	x		x	x
	FROM: (K2)  D3 - D7  D3 - C7  C3 - C7  C3 - C7  E3 - C7  A3 - A2  A1 - A2  A1 - A2								
33	Relay 518915-1, maximum current through contacts: 10 Amp, minimum current through contacts: 40 milli-Amp (!)	4Al	1.2 1.2.j.i: 1.2.k.i:	i	×	x	x	x	x
	Considering that very low current signals (38 micro/Amp!) will be handled in the System, the following is recommended:		1.2.1.i:						
	Change the circuitry to assure passage of low current signals!!! (Current amplification?, solid state?)								
34	Relay 518915-1, maximum current through contacts: 10 Amp, minimum current through contacts: 40 milli-Amp (!)	4A2	1.2.a.ii 1.2.b.ii 1.2.c.ii	i Li	×	×	×	×	×
	Considering that very low current signals (38 micro/Amp!) will be handled in the System, the following is recommended:		1.2.d.i: 1.2.e.i: 1.2.f.i: 1.2.g.i:						
	Change the circuitry to assure passage of low current signals!!! (current amplification? solid state?)								
35	Include the necessary instruction (to observe the Power Monitor Light and switch off the Power Switch) for Maintenance personnel before they start working on the Unit 4A3.	4A3	1.2	×	×	×		x	x

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards
- b -
- Incorpóration of Fail-Safe Principles Existing Design
- Future Design

MK1 MOD O LSO-HUD CONSOLE SYSTEM

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	·	S	SA	REI	ATEI	70:		FO	R:
NO.	RECOMMENDATION	UNIT	ITEM NO.	å	ь	c	۵	e	£
36	Route the two pair of Wave-off Signals through two different Cables.	CABLES	1.2	x	x	x		×	x
37	Evaluate a possible redundant provision of power and provide such design change if found viable and advantageous.	CABLES	1.11	x	×	x		x	x
38	Provide redundancy in the warning arrangement of the Deck Status (Cable W235 and W231).	CABLES	1.16 1.11	x	×	x		x	x
39	Provide overvoltage protection for three power supplies in the test simulator.	5	l.la	•	×			x	x
40	Install power supply indicator lamps to show power supply status. (Suggest usage with No. 39) Expediting fault isolation.	5	1.la	x				×	×
41	Utilize three additional positions on meter switch S8 to check power supply output on the DVM.	5	l.la	x				×	ж
42	Install an indicator lamp to show AC to the switching relays.	5	1.1b	x				x	х
43	Consider a two-handled simulator enclosur as the present one-handled enclosure is somewhat bulky. (11.5" x 16" x 10", 251b	1	1.3			×		×	×
44	Recommend the DVM be externally tested as the first step in fault isolation (where the DVM is utilized)	5	2.0 Pr	oce	dur	es			
45	Recommend the drawing package be inspected for consistency.	5	2.0 3.0 4.0	×				x	x
<u> </u>									

- General Reliability, Simplification, Design Improvement Avoiding, Eliminating & Reducing Potential Hazards Controlling & Minimizing Potential Hazards

- Incorporation of Fall-Safe Principles Existing Design
- Future Dosign

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